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RETIRING STEEL CORPORATION STOCK.

For the first time since the United States Steel Corporation was organized there was opposition from the stockholders to a financial proposition made by the directors at the meeting on Tuesday of this week in New York. The opposition, however, was little more than nominal, and the proposition, which is to convert 2,000,000 shares of the preferred stock into $200,000,000 of 5 per cent. sixty-year second-mortgage bonds, and for an additional issue of $50,000,000 of such bonds for cash, was approved by the following vote:

For—3,745,731 shares of the preferred stock and 3,958,557 shares of the common stock.

Against—4,865 shares of the preferred stock and 7,678 shares of the common stock.

The opposition was not so much against the proposition to retire the preferred stock by a bond issue as to the underwriting contract with J. P. Morgan & Co., by the terms of which the underwriters are to receive 4 per cent. commission upon all bonds placed. Samuel S. Stone of Providence, R. I., who holds twenty-five shares of preferred stock and twenty shares of common, was the chief spokesman of the opponents of the scheme. He said he didn't think it was at all necessary to pay a commission of $8,000,000 for converting stock worth 90 into bonds, the assured prospective value of which is 95. "It seems to me," he said, "that the public will jump at such a proposition as that without any coaxing and the stockholders can attend to the business of retiring the preferred stock without the help of an underwriting syndicate."

Judge Gary replied for the officials of the corportion that over 77 per cent. of the holders of both preferred and common stock had sent proxies in favor of the proposition.

John Trehane, a member of the American bar, now living in London, the owner of fifty shares, also entered a protest. The plan of issuing $50,000,000 new bonds for the purpose of improving old properties and paying for new ones Mr. Trehane approved, his criticism being chiefly directed to the proposal to add $10,800,000 a year to the fixed charges of the corporation by issuing $200,000,000 bonds in exchange for an equal amount of preferred stock. He added: "And what is to be the consideration to the corporation for this enormous responsibility which you are urging us to force upon it? Not one dollar; but, on the contrary, it is to pay out of its coffers the considerable sum of $8,000,000 to the syndicate which shelters some of your number, for the skill and energy displayed in fastening this heavy burden on its back. To pay a man a commission for getting one money is a common enough transaction, but to pay him a commission for getting one into debt is a financial novelty which would be amusing were it less expensive."

After adjournment of the meeting Mr. George W. Perkins, a member of the board of directors, made a speech and invited the stockholders to take notes. He said:

"I know that there has been some feeling here today, but I believe that the opposition sprung from worthy motives and that the opponents thought they were acting in the best interests of the United States Steel Corporation. When the company was put together we had money enough to cover every expense except one, which was an unknown quantity—the expenditure for which the subsidiary companies had already arranged. We found afterward that these contemplated expenses amounted to $40,000,000 or $50,000,000. They were reduced to about $15,000,000. To capitalize that and to round out the general plan and harmonize the different parts about $50,000,000 is needed. We might have got it by issuing more preferred stock. We couldn't have got more than 90 for it, or $45,000,000 for $50,000,000 face value. There would have been an initial cost of $5,000,000, but, the expense of raising our $50,000,000 wouldn't have stopped there, because we would have had so much more stock to pay 7 per cent. dividends on or an additional expense each year of $3,500,000. We might have issued a second mortgage bond, but couldn't have got more than 95 for it. There would have been an initial cost of $2,500,000 and an interest cost of $2,500,000 every year. But by the scheme we have finally adopted we have an initial cost of $10,000,000, but the expenses stop right there. For the rest, we save the difference between our 7 per cent. dividends and the 5 per cent. interest on the bonds. We have been criticized for being overcapitalized. It is rather a pleasant thing, then, to retire some of the stock."

EXPANSION OF OUR FOREIGN COMMERCE.

Mr. O. P. Austin, chief of the United States treasury department bureau of statistics, delivered an address before the Manufacturers' Club of Philadelphia on Monday evening last on the subject, "The Expansion of Our Foreign Commerce."

The rapid expansion of the foreign commerce of the United States, Mr. Austin said, is the natural consequence of the rapid expansion of production which followed the great development in railway construction in the closing quarter of the nineteenth century. Following the construction of the transcontinental line which was completed in 1869, came the extension of other lines through the great Mississippi valley and the south, and this resulted in the opening of the great agricultural, forest and mineral areas whose natural supplies have made this the greatest producing country of the world; while the multiplication of railways facilitated the assembling of these natural products for use in manufacturing. As a result, agricultural production has doubled, and in many cases more than doubled, and the value of farm products increased from less than $2,500,000,000 in 1870 to about $4,375,000,000 in 1900. In products of manufacture the increase has been even more rapid. The production of coal, a prime necessity in manufacturing, grew from 33,000,000 tons in 1870 to 290,000,000 in 1901; pig iron, from less than 2,000,000 tons to over 13,000,000; and steel, from less than 70,000 tons to over 10,000,000 tons. Meantime the railways had grown from 52,000 miles in 1870 to practically 200,000 miles at the present time, and rates for rail transportation have fallen to about one-third the rates of 1870. The result of all this is that the United States has become the greatest exporting nation in the world, having risen from fourth place in 1870 to first place in 1901. The value of our exports during that time has practically quadrupled, the figures having been, in 1870, $393,000,000; in 1901, $1,487,000,000. Meantime imports have scarcely doubled, the import figures being, in 1870, $436,000,000; in 1901, $823,000,000, the per capita of imports having fallen from $11.06 to $10.58, while those of exports increased from $9.77 to $18.81.

The causes of this wonderful development in exports, in Mr. Austin's opinion, are to be found in the fact that the United States is the world's largest producer of the great articles required by man for his daily life. The chief requirements of man are food, clothing, heat, light and manufactures; and of all these the United States is the world's largest producer. The principal articles of food are breadstuffs and meats, and of wheat the United States produces more than any other country, and of corn more than all other countries combined; while of meats the United States is also the world's largest producer. For clothing the article of largest requirement is cotton, and of this the United States produces more than three-fourths of the world's supply. For heat, coal is the greatest requirement, and of this the United States is now the world's largest producer and our supply exceeds that of any other country; while for light our production of petroleum furnishes a larger quantity of refined illuminating oil than that of any other nation. In manufactures the United States is also the world's largest producer, the value of our manufactures being nearly double that of the United Kingdom, and nearly equal to that of France, Germany, and Russia combined.

This commanding position in the world's commerce is, in Mr. Austin's opinion, likely to be retained by the United States. The power of production shows no signs of abatement, while we may reasonably expect that the development of science and invention and the application of American energy will still further reduce the cost of production and transportation. This high standing of the United States as an exporting nation will, Mr. Austin said, be welcomed by the commercial world rather than antagonized, as has been intimated and feared in certain quarters. The commercial world buys the products of our fields and factories because it requires them for daily use and because it can obtain them more readily and cheaply from the United States than from any other part of the world. Suggestions of the exclusion of American products of the field or factory seem scarcely likely, in Mr. Austin's opinion, to be realized. The effect of the refusal of Europe to purchase from the United States any of the great articles of which we furnish so large a proportion of the world's supply would be to cause an advance in the price of those articles in other parts of the world. The United States supplies one-fifth of the wheat entering into international commerce, three-fourths of the cotton, and practically all of the corn; while our proportion in the meat supplies of Europe is also large. To thus eliminate our production from the world's supply of these great articles of daily requirement would be to cause an advance in the prices of the limited supplies which could be obtained from other parts of the world. Hence, in these natural products, it may be expected that the demand will continue indefinitely, while the fact that the United States in 1901 sold to Europe alone more manufactures than she had ever sold to the entire world in any year prior to 1895, shows the progress that American manufacturers are making in Europe, the great manufacturing center of the world.

Turning to the import side, Mr. Austin said that it must be expected that our imports will continue to grow. In the present fiscal year they will exceed those of any earlier year in our history, and the reasons for continuous growth are coincident with our growth in manufactures. While the United States is the world's greatest producer in the chief elements required in manufacturing, it does not produce certain articles of tropical and subtropical growth of which the manufacturers are requiring constantly increasing quantities, such as raw silk, fibers, Egyptian cotton, india rubber, and many other articles of this character. Add to this the tropical requirements for food, such as coffee, cocoa, tea and such portions of the sugar and tropical fruits as are not produced at home, and it is apparent that the importations must increase, and especially those from the tropics. The value of tropical and subtropical products imported has grown from $143,000,000 in 1870 to over $400,000,000 in 1901, and the share which they form in our imports has grown from 31 per cent. in 1870 to nearly 50 per cent. in 1901, and this proportion seems likely to increase. This fact of our growing dependence upon the tropics, indicates, in Mr. Austin's opinion, not only that our imports must continue to grow, but that the events of the past four years have been of incalculable advantage to us in the fact that they have brought under the American flag an area capable of producing a large share of these tropical requirements, and taking an equal quantity of our products in exchange therefore.

NAVAL ARCHITECTS IN GERMANY.

The summer meeting of the German Society of Naval Architects will be held at Dusseldorf from June 2 to 5. The program of papers to be read includes the following: "Iron Industry and Ship Building in Germany," by Mr. Schrodte; "The Materials and Tools for Ship Building at the Dusseldorf Exhibition," by Mr. Gotthard Sachsenberg; "Development of Navigation on the Rhine," by Baron v. Rolf; "The Use of Steel Wire Rope for Navigation," by Mr. Schleifenbaum. Technical excursions will be made to several of the important ship yards and iron works in the vicinity of Dusseldorf. It will be seen that the program from the technical standpoint is not extensive. In fact it seems to be largely social. Extended trips down the Rhine are contemplated.

THE CANADIAN LAKE SUPERIOR REGION.

"While it may be possible that on account of glacial erosion the product of high grade ore in Canada may be less than in the districts of similar size and geological position on the United States side of the boundary," says Mr. C. R. Van Hise in a report on the Lake Superior ore region to the United States geological survey, "it cannot be doubted that in the future important quantities of iron ore will be exploited in the Canadian Lake Superior region. Doubtless, also, this exploitation would have been begun many years ago were it not for the duty which ores mined in Canada must pay when entering the United States."

The Vermillion iron-bearing series has been traced to Hunters island. Thence these rocks have been mapped by the Canadian survey as extending first in a northeasterly and then in an easterly direction to the Kaministiquia river, and thence eastward to the Keneenawan rocks west of Lake Nipigon. Another great belt of iron-bearing rocks with various ramifications has been traced by the Canadian survey from Rainy lake eastward to the Canadian Pacific railway and to Lac des Mille Lacs. In this belt occurs the so-called Atikokan range, in which large deposits of iron ore are said to outcrop. East and north of the east half of Lake Superior various areas of iron-bearing rocks are also found. One or more belts are said to extend east from Lake Nipigon. A belt is found adjacent to the Black and Pic rivers. Several belts of iron-bearing formation have been found in the Michipicoton district.

At the present time the only one of these districts which is an ore producer is the Michipicoton. While this district has not been connected areally and structurally with any other area in the Lake Superior region, the likeness in the character of its rocks and its succession to the Vermillion district leaves little doubt that the two districts are in most essential points parallel. In the Michipicoton district the basement rock is a greenstone, showing the ellipsoidal structure on the great scale so characteristic of the Ely greenstone of the Vermillion district. It contains substantially all the varieties of material in the iron formation of the Vermillion district, and in addition great quantities of pyritic quartz rock. On the bluff back of the Helen mine and at many other places iron carbonate is abundant. Near the Helen mine Mr. Merriam reports this carbonate as containing 19 to 37 per cent. of metallic iron. These abundant cherty carbonates leave little doubt that the ferruginous cherts, ferruginous slates, jaspers and iron ores have mainly developed from a carbonate as the original rock, precisely as in the various districts south of Lake Superior. However, it is clear that the pyrite of the carbonates and the pyritic quartz rocks have also made contributions. At the present time the iron formation has been developed only at the Helen mine. Here a good body of high grade hematite has been shown by stripping to extend in considerable areas to the rock surface. In 1901, the first year of shipment, 62,000 tons were shipped.

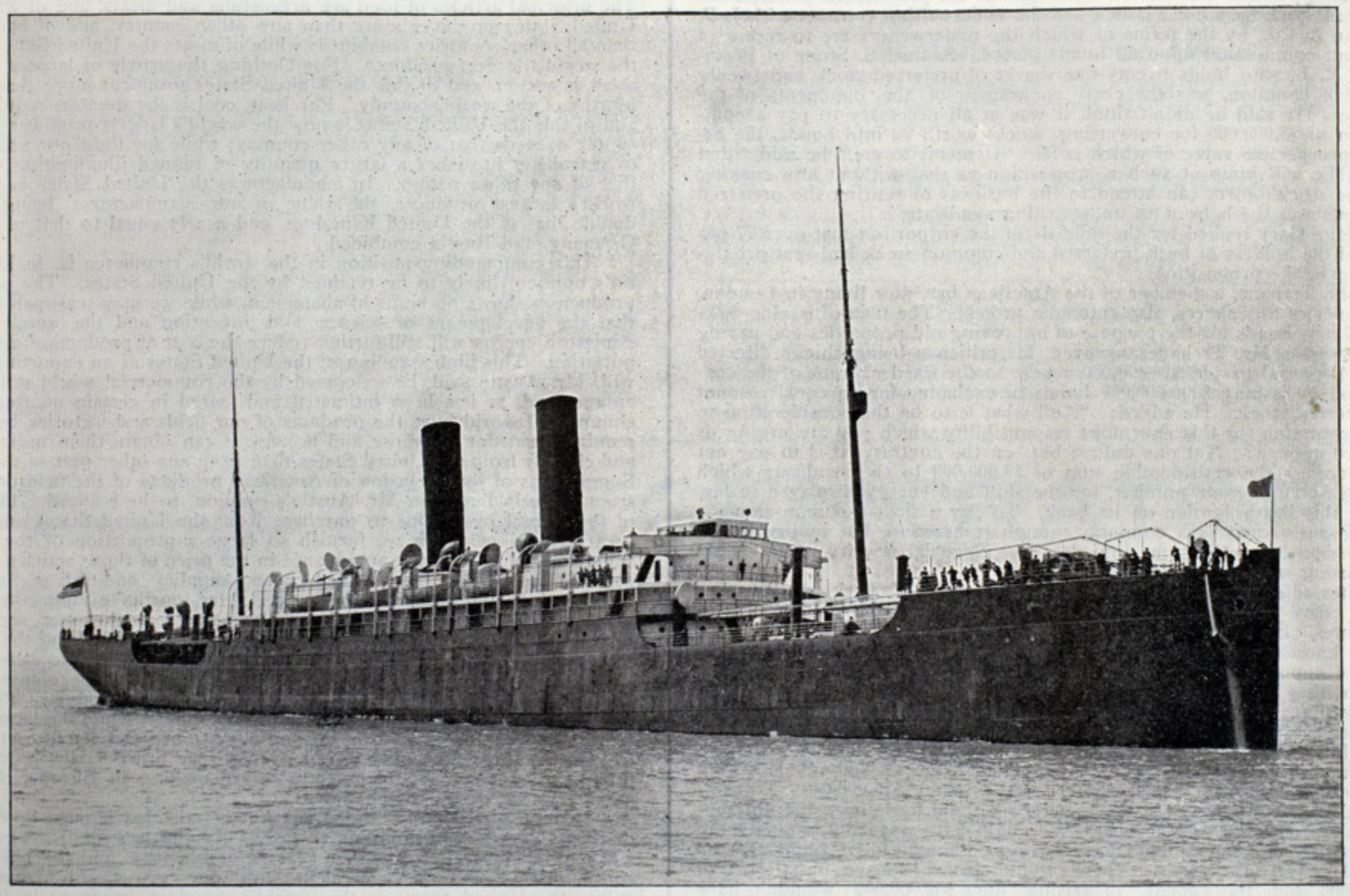
The Townsend & Downey Ship Building & Repair Co., Shooter's Island, N. Y., has laid the keels for three new large steel tank barges for the Standard Oil Co. Each keel is 360 ft. in length.

For the first time since the spring of 1895 a vessel was launched at Brewer, Me., last Saturday. She was the new passenger steamer Verona, launched from the Barbour yard.

NIAGARA RIVER DAM VIEWED ASKANCE.

Buffalo, May 20. It appears that the advocates of the Niagara river dam for raising the level of Lake Erie are still busy giving reasons for their position and from their standpoint they are making out a good case, but they are not meeting the case of the shore resident by a long chalk, as it is quite easy to show. For instance, Buffalo is now fully committed to the spending of about $750,000, as estimated, to abate the floods that are making life a burden and seriously reducing the value of property on lower Buffalo river. Does anyone suppose that this city will permit the building of any sort of structure right at her doors that will make all of this great special outlay useless? Buffalo river flows without much current into the head of Niagara river, so that the dam would have to be built below it. Again there comes the ice problem. Forecaster Cuthbertson called my attention to it the other day by remarking that with an accumulation of ice such as existed this spring and is likely to be in front of the harbor any spring, it would take all of the present narrow connection between lake and river to get rid of it in a fair amount of time. There was so much ice in the way this spring that but for one or two days of east wind that scattered it up the lake, where the water was getting warmer, it would easily have been here yet in great part, on account of the prevalence of dry, cool weather so far. The forecaster seems to be of the opinion that it would often be June before the harbor could be opened if a dam was built that would narrow up the outlet to the lake very seriously. Perhaps this objection could be met in some way, but it so often happens that after the other Lake Erie harbors are all open there is a matter of 50 miles of ice the full width of the lake to be got rid of before Buffalo is open for navigation. It will hardly pay to make the situation worse, even for the sake of better water in low seasons, especially as Buffalo harbor is now prepared to move out to the lake front if necessary and will do so to a great extent soon anyhow, where there is water "to burn" all the season. With the biggest steel plant in the country already there, prepared to begin operations this year to the annual tune of 1,250,000 tons of steel, another located there and a third one in the air, Buffalo river as a harbor is no longer the whole thing, and its claim as business and residence territory demands more consideration.

JOHN CHAMBERLIN.



NEW STEAMSHIP KOREA OF THE PACIFIC MAIL LINE.
Built by the Newport News Ship Building & Dry Dock Co., Newport News, Va.

The Queen Caroline, just launched from the yards of the Baltimore Ship Building & Dry Dock Co. for the Queen Anne Ferry & Construction Co., is a good specimen of the modern day passenger steamer designed for short routes in American waters. She was designed by Mr. Charles Green. Her principal dimensions are: Length between perpendiculars, 187 ft.; length over all, 200 ft.; beam, molded, 31 ft.; mean load draught, 7 ft. 9 in. The motive power consists of a triple-expansion, direct-acting, inverted engine, having cylinders 16, 25 and 42 in. diameter with a common stroke of 30 in. Steam is supplied by four Scotch boilers, 9 ft. in diameter by 10 ft. long. The steamer will be most beautifully appointed throughout. She will accommodate about 1,000 passengers.

The tug Lancaster, built by the William R. Trigg Co., Richmond, Va., for the Pennsylvania Railroad Co., was launched a few days ago. The dimensions follow: Length over all, 105 ft.; beam, 22 ft.; depth, 12 ft. 6 in. The next event at the Trigg yard will in all probability be the launching of the government cruiser Galveston.

CO-OPERATION WITH THE WEATHER BUREAU.

(Willis L. Moore, in Ship Masters' Directory.)

It is important that ship masters should bear in mind that the storm warning service of the United States weather bureau is conducted by the government for their sole and special benefit, and that all information possessed by observers at the various stations is cheerfully furnished, absolutely without charge. The observers of the weather bureau in charge of lake stations are men of long experience, and it is a most important part of their duty, and a pleasure, to serve, to the extent of their resources, ship masters, ship owners, and all who are interested in lake transportation. But the weather bureau cannot serve those ship masters who cannot, or will not serve themselves. In my experience as an observer in charge of lake stations, I have encountered a class of men, now rapidly becoming extinct, who boasted of a weather knowledge superior to that furnished by the weather bureau and its reports. A series of disasters to vessels commanded by some of these men has naturally made owners reluctant to trust property to their keeping. They prefer to employ men who possess more caution, if not more intelligence; and, as a business proposition, underwriters will not knowingly take ordinary risks on vessels officered by careless or reckless men.

In weather bureau, as in other lines of work, success cannot be achieved without the co-operation of those for whose benefit the work is conducted. The ship master must co-operate to the extent of giving the warnings careful and intelligent consideration. He must realize that the warnings are not idly issued, but are based upon actual existing weather conditions which forecasters of proved capacity and long experience have, after careful study, deemed threatening for the districts for which warnings are issued. They must realize that the ship master who consults the reports and heeds the warnings of the weather bureau is reducing the chance of disaster by storm to a minimum.

It is obvious that the value of storm warnings depends both upon their accuracy and the means which are employed to give them prompt and effective distribution. On the great lakes the system of storm warning display and distribution has been materially improved during the past year. Steel towers of a standard pattern have been substituted for flagstaffs at a number of points, and stronger lights for night warnings have been installed at several stations. The advantage of displays made with the improved apparatus referred to lies in the fact that they are given a greater elevation than is afforded by stations, and that their sites have been carefully selected on buildings and grounds with special reference to an increase in the ranges of visibility of the flags and lights. During the coming year the work of installing towers and high power lights will be continued to an extent which the fund appropriated for that purpose will permit.

At the present time there are ninety-seven storm warning display stations on the great lakes manned by observers or agents of the weather bureau. At a large proportion of these stations warnings and advices are repeated to sub-stations and distributed by wire or bulletins to the shipping interests of the communities in which they are located. The system is as complete as funds and facilities for disseminating the advices will permit, and one of its provisions places, in a degree, the responsibility for securing the warnings upon the ship master; that is, any ship master can telegraph at government expense from any port at which a weather bureau station is not located to the observer at Chicago or Buffalo for the latest advices regarding the weather. At ports which possess a station of the weather bureau advices of this character can be secured either by telephone, by bulletins which are locally posted for the information of ship masters, or by a visit to the office of the observer.

We, of the weather bureau, are your servants. We wish to serve you faithfully, and to do all that science can accomplish in making your sailing less perilous. Command us.

REACHING THE NORTH POLE IN AN AUTOMOBILE.

Andree tried to reach the north pole in a balloon and succeeded only in adding one more to the world's mysteries; Nansen tried to walk to the pole; and now news comes from Ottawa that Capt. Bernier, the Canadian explorer, is to endeavor to reach the pole in an automobile. The automobiles in which he proposes to make the last stages of his trip to the north pole are adapted from a Russian invention. Instead of wheels they have rollers. Such invention has been used, it is said, with success on extensive ice packs similar to those of the polar regions. The nearer to the pole the closer is the ice packed presenting after snowfalls a comparatively smooth surface for many miles at a stretch. Rough masses of ice and large spaces of open water are less common. The captain's plan is to place his vessel in the ice pack off the coast of Siberia, at a point which he calculates will drift him to the nearest point attainable to the pole. When that point is reached he will disembark working parties, who will carry wireless telegraph outfits, with which his ship is also to be furnished. The parties will drill holes in the ice and plant poles as landmarks as they proceed and establish their first station and storehouse about 50 miles from the ship. The road having been made as practicable as possible, the automobile sleigh will be put into commission to stock the station with supplies. In the meantime other parties will be working on toward the second 50-mile station, and so on. There will be a second automobile in reserve or for use where two can be usefully employed, as well as dog sleighs with teams of thirty dogs.

The sleighs on which the motors are to be placed will be so constructed as to be capable of being used for navigating open stretches of water, where such cannot be avoided. In case rough ice is met with that presents an insurmountable obstacle to the automobiles the machines will be disconnected and taken to pieces and portaged, a work in which Canadians, such as will form a large proportion of the exploring company, have been familiar with since infancy. Power for the electric dynamos will be furnished when the conditions allow, by windmills, and there will be electric lighting and heating. There will be regular wireless communication with the civilized world through Dawson City. Capt. Bernier's plan for drifting with the currents that carry the packed ice to the coast of Greenland is based on actual observation by men experienced in the polar seas, among whom are several members of his own family.

Capt. Bernier's exploring ship is to be 133 ft. long, 3 ft. beam, 18 ft. depth of hold and a little over 300 tons register, to run under both steam and sail. She will have a perpendicular stern post with the rudder outside, making it possible to unship at any time either the rudder or propeller. This will be a great advantage and prevent the rudder and screw getting frozen up by being jammed in the ice, as was the case with other Arctic vessels, while their build rendered their stern weak. Capt. Bernier's ship will also have a flush deck, which will prevent her being overweighted with an unnecessary load by the frequent flooding of the forward deck by water and slushy snow, as was the case with other vessels visiting the Arctic regions.

The engines will be more powerful and better protected than in any other Arctic vessels hitherto constructed. She will have three masts, and her total sail area will be 1,000 ft. more than that of the Fram, or 7,000 sq. ft. She will be provisioned for a six years' voyage and will have a company of fourteen. These will consist of six scientific men, including a surveyor, an astronomer, a geologist, a biographist, an artist, photographer and doctor. There will be three navigators, all qualified as captains; three sailors, one engineer and one assistant engineer, who will be a mechanic and electrician.

JAMES J. HILL ON THE NICARAGUAN CANAL.

James J. Hill, president of the Northern Securities Co., is exceedingly plain spoken on Nicaraguan canal question. He says:

"Every one who has made any scientific investigation of the subject knows that Nicaragua is one of the most volcanic regions of the earth and that earthquake disturbances await any great public works that can be erected there. But what does your average congressman care about that? What does he care about a volcano, if it is not in his own district? You may lay before him the history of all the forty or more volcanoes of Central America, with a century record of earthquakes brought down to the last sixty days, and your congressman who is talking Isthmian canal in glowing rhetoric will ignore the scientific facts completely and vote to spend $100,000,000 or $200,000,000 of the people's money right in the midst of the eruptions. You may stand him before a belching volcano and he would never see it, unless, as I say, it were right under him in his own district, and then he would feel it, if he couldn't see it. Nicaragua is a dangerous and unfit place for any great works of a public character and, most of all, for a vast canal system built of concrete and masonry to which any earthquake or volcanic disturbance would be fatal. It is a nasty, crooked route, anyway, curving and dodging about among the volcanic peaks. It is not a safe place to put any big vessel."

BRITISH OUTPUT OF STEEL RAILS.

The British Iron Trade Association reports the output of steel rails in Great Britain to have been as follows:

Years.	Tons.	Years.	Tons.
1880	739,010	1891	662,676
1881	1,023,740	1892	535,836
1882	1,235,785	1893	579,386
1883	1,079,174	1894	598,530
1884	784,968	1895	604,338
1885	706,583	1896	817,476
1886	730,343	1897	921,131
1887	1,021,847	1898	751,591
1888	979,083	1899	838,148
1889	943,048	1900	759,844
1890	1,019,606		

BRITISH WAR EXPENDITURES.

The London Statist figures out the following as the British war expenditure, exclusive of interest on the war debt:

1902-03 (estimated)	£59,050,000
1901-02 (actual)	69,830,000
1900-01	67,237,000
1899-1900	23,000,000
Total war expenditure	£219,117,000

It puts the total cost of the war, direct and indirect, at something over £250,000,000. The following list of army and navy annual expenditures is appended:

	Army.	Navy.	Totals.
1902-03	£29,665,000	£31,255,000	£60,920,000
1901-02	29,685,000	30,876,000	60,561,000
1900-01	24,473,000	29,520,000	53,993,000
1899-1900	20,600,000	26,000,000	46,600,000
1898-99	20,000,000	24,068,000	44,068,000
1897-98	19,330,000	20,850,000	40,180,000
1896-97	18,270,000	22,170,000	40,440,000
1895-96	18,460,000	19,724,000	38,184,000
1894-95	17,900,000	17,545,000	35,445,000
1893-94	17,840,000	14,048,000	31,988,000
1892-93	17,542,000	14,302,000	31,844,000
Increase in ten years.	£12,123,000	£16,953,000	£29,076,000
Percentage increase..	69	118	91

Two large steel car-floats have been ordered from the Fore River Ship & Engine Co., Quincy, Mass., by the New York, New Haven & Hartford railroad. Their construction will be in accordance with the rules of the United States Standard Register of Shipping and they will be practically unsinkable. Each of the floats is to have three tracks, on which twenty-three fifty-ton cars may be set at one time. Their length over all will be 317 ft., their extreme breadth 40 ft. 1 in., and their depth of hold 10 ft. 4 in. They are to be "joggle-plated" and the hulls will be braced with four lines of trusses running their whole length. Each float will have sixteen water-tight compartments, which the specifications require shall be built with special care, and will be cement lined. Yellow pine fender strakes and white oak staving are called for by the plans. The lines of the barges have already been laid down on the scrive board and the materials for their construction have been ordered.

THE STEAMSHIP COMBINATION.

IT IS STILL THE PRINCIPAL SUBJECT OF DISCUSSION IN THE BRITISH PRESS —A SUMMARY OF WHAT IS BEING SAID BY THE LEADING JOURNALS.

It is quite apparent that the London Times is the mouthpiece of the Morgan interests in England. It is the only newspaper that has maintained an even and respectful bearing; the rest have all been shriekingly hysterical. Indeed we have rarely read such rubbish from the shipping standpoint as the English newspapers have lately been publishing. The technical papers take a very sober and sane view of the situation and are inclined to believe that the remaining 96 per cent. of British tonnage can take care of itself. The Morgan subtraction is more spectacular than vital. The White Star line has been intimately associated with the British government since the creation of the line in 1872. It has carried the troops to all quarters of the globe, and in a way every home in Britain and her colonies has had a personal interest in the ships of the White Star line. Hundreds of thousands have gone from their homes in ships of this line and thousands upon thousands have left their blood to sink in the sands and their bones to bleach in the desert. Lately 250,000 were taken to South Africa and never a life was lost in transit. The transfer to American interests of such a line could not fail to arouse a storm. But after all the feeling is only sentimental. It is not commercial in any sense. The ships have undoubtedly brought a good figure and the money will unquestionably be employed to build better ships. One can't with a 4 per cent. purchase snuff out the maritime life of a nation which to exist at all must depend upon the sea. Nor have the newspapers on this side of the Atlantic been any wiser. They seem to think that Mr. Morgan has conferred upon the American people the blessings of an American merchant marine. The fact of the matter is that only four ships out of the hundred or more that are in this shipping combination are flying the American flag. We don't see how the rest are ever going to fly the American flag unless the navigation laws are repealed to admit them—a proceeding which would be opposed by every other interest which has capital invested under American register. We hope we are mistaken, but the combination does not present to us a favorable aspect as far as American shipping and ship building is concerned. The Belfast firm of Harland & Wolff, which has built all the White Star liners (built them without even so much as a contract), seems to have the preference as far as future additions to the fleet are concerned. Moreover, the fact that such a combination exists has put a quietus upon the shipping bill. We will not argue the justice or injustice of this. In our judgment it is unjust; but it is patent that no congressman would try to convince his constituents of its injustice. Yet an American merchant marine, such as existed before the civil war, is a long, long ways off unless the government steps in and aids it. Mr. Morgan and his associates have combined these various lines as adjuncts to their railways. The venture with them is not patriotic; it is business; they have probably not given the flag a thought. Upon this point Engineer of London says:

"In the whole transaction as it stands at present it is not easy to see where the United States comes in. Until an act of congress has been passed permitting the transfer, the ships must sail under the British flag and be subject to the board of trade and British maritime law. It is stated that the management of the lines will in all matters of detail remain in the hands of those who now carry on the traffic. In so far we should have merely a preponderance of American shareholders taking the place of British shareholders, bought out at a long price. But, on the other hand, Mr. Morgan and Mr. Schwab may handle the shareholders in such a fashion that these two gentlemen will be entire masters of the situation. Yet even then, indeed, then less than ever will Mr. Morgan represent the United States. It is only just so far as Mr. Morgan has the confidence of congress, the senate and President Roosevelt, that he can be regarded in any other light than a very remarkable speculator, who regards the whole world as a field in which to make money. When we find the people of the United States legislating in Mr. Morgan's favor the position may become serious, but not till then."

Engineering of London bases all that it has to say upon the attitude of the London Times. The Times argues that ocean travel on the Atlantic has been carried on on a scale of too great magnificence. Decorations have become gorgeous and costly beyond all proportion to the needs of the people. Engineering admits this, but declines to admit that the Atlantic liners are either too powerful or too well equipped. It fears that the combination may check advancement along engineering lines. The Times says that the powerful and magnificently equipped steamers will not be reproduced in the future. "In the busy seasons of good years," says the Times, "they may do very well; but taking one season with another and one year with another, there is a vast investment of capital upon which no adequate return can be secured."

The views of Engineering are not optimistic. They are reproduced herewith in the form of an argument with the Times article. Discussing the fact that ships are costly to the standpoint of being ruinous, Engineering says:

"A more legitimate argument in favor of combination is that which states that, owing to competition, costly vessels are run in the dull season without sufficient passengers to make them pay. We think, however, that too much is made of this fact. In the ocean passenger trade, as with land travel, there is necessarily an ebb and flow of the stream of traffic, and provision must be made for the maximum demand. More might have been done by the shipping companies to equalize the 'load factor.' Had greater inducements, in the way of lower fares, been offered the people to travel during the slack months, it would have done much to ease the pressure in the busy season, when wealthy tourists make the passage irrespective of cost. In any case, whether there is a combine or whether the different companies act independently, the accommodation must be equal, as we have stated, to the maximum demand; and if it does not pay to run large and costly ships, smaller ones should be substituted. Naturally, there is dead capital entailed by laying up the steamer; but this is a charge that is inevitable, and would be the lesser evil. The Times has lost its faith in competition. 'There was a time,' we are told, 'when competition was the last word of political economy, and when the public were taught to look with complacency upon the process by which one set of ships may be run off the ocean by another. But competition nowadays is the preliminary to combination, or, at least, to working agreements having much the same effect as combination. It is evident that the ruinous competition of the North Atlantic carrying trade is to give place to regulated co-operation.' Here, again, we have a repetition of well-worn arguments from across the Atlantic, and admire the expression 'regulated co-operation' as an ingenious euphemism for 'monopoly.' This 'regulated co-operation' is not to be confined to sea-carriage, for we are told that the combination will work in unison with the large American railway companies, which have power to determine to a large extent the sea carriage of the goods they bring to the coast. How long it will be before Mr. Pierpont Morgan will try to grasp the trunk lines of Great Britain we forbear to speculate; but such an enterprise does not appear to be beyond his ambition. In that case—and one might almost say in the present case, so far as goods carriage is concerned, for the stream of traffic is nearly all from west to east, owing to the American protective tariff—the destinies of British trade would be in the hands of Mr. Pierpont Morgan and his coadjutors, for the English railways would be able to boycott all independent ships, as it is the program of the American lines to do. It has been stated, not without complacency—for, truly, we are not beloved—by a foreign newspaper that Mr. Pierpont Morgan will be able to starve England at any time. We have not much fear of such an event, because it would be like killing the goose that lays Mr. Morgan's golden eggs. There is, however, the possibility that it may suit the American managers of the combine to divert trade from British shores to Continental ports. We ar told already that Liverpool is to be abandoned in favor of Southampton—a dislocation of the economic condition of the country that would lead to serious results, without, so far as we can see, any sufficiently compensating advantages. The Times, in the conclusion of its article, refers to the general public as a remainder. 'There remains,' the writer says, 'the general public, and in particular that portion of it which patronizes Atlantic liners.' The statement is significant, but the general public is told to be of good cheer. It is true 'the abatement of competition may be thought to involve some risk that it (the public) will not be so carefully looked after in the matter of comfort and luxury as hitherto, and, perhaps, some may go so far as to fear increase of fares and freights.' These things, the Times judicially allows 'are no doubt possible,' but adds, with trustful innocence, 'it is not probable they will occur.' We fear that the general public, after a year or two's experience of the rule of a combine, will not share this opinion of its benevolence; indeed, the contrary is almost declared in the statements that have been made. It would require almost a reversal of human nature—at any rate, financial human nature—to suppose that a combine, once having the shipper and passenger in its grip, would be over tender in regard to freight and charges; and we may conclude it would not be too enterprising in providing new 'fleets of powerful and magnificently-equipped steamers.' But we are told, 'at all events he (the passenger) will not be quite helpless so long as the Cunard company maintains its attitude of splendid isolation.' So even yet there is some faith in competition; but that last hope is denied to us if—as seems to be pretty generally allowed—the Cunard company is also to be brought into the fold. There is wisdom in the saying, which we have heard pretty often just lately, that we should not mix sentiment with business. We agree with this so far as it is unwise to attempt to manufacture for ourselves those commodities which, from natural conditions, can be better produced abroad. But does this principle apply to the shipping trade? and if so?, what is the reason? It is not now a question of building ships, but of their management in trade when they are built. Have Englishmen lost the genius they once undoubtedly possessed for this business? Is the breed extinct that built up our great lines—the Cunard, the White Star, the Peninsular & Oriental, and other companies—which have carried British products all over the world? The pioneers themselves are dead, but are there none of their descendants able to carry on the work? Has a breed of pigmies succeeded to the race of giants? The Times, in a second leader, which does much to modify the one from which we have already quoted, refers to 'men like Mr. Ismay, of the White Star line, to say nothing of others,' as not likely to do anything that would be dangerous to the trade of this country; but a few lines later on it states that 'as a commercial and industrial community we have fallen a little behind in the energy and efficiency with which we conduct our affairs.' Presumably, therefore, we have to call in American financiers of the stamp of Mr. Pierpont Morgan to keep us afloat. It is a pity, we are told, that British ship owning concerns should not have been able to combine among themselves for the purposes of common interest to them; but, the writer adds, it is less their fault than that of the state of the law in this country. Mr. Pierpont Morgan, therefore, will find some means, not open to British subjects, to evade the law of this country. What will these means be? We are told that we are not to fear the transfer of the English ships to the American flag. The arrangements are calculated to allay apprehensions as to 'disquieting rumors of contemplated wholesale transfers of British shipping to the American flag.' Questions have been asked in the house of commons on this point, but little information is to be gained from the replies. It seems evident, however, that in the case of mercantile cruisers, subsidized by the government, that the British ensign will continue to be flown, so long as the present arrangement with the admiralty lasts. After that we shall be dependent upon the American controllers of the combine as to what will occur. We have no great faith in the shibboleth that 'trade follows the flag,' if the following is supposed to depend upon patriotic sentiment. A manufacturer or trader in England or the colonies does not stop to inquire whether the goods he buys have been carried in a British or a foreign ship. But trade does follow the flag if the flag brings better facilities for the transport of goods. That condition

exists for English people when the management of a shipping company has its headquarters in England, and when the ships trade from British ports. If patriotism does not count for much in trade, it does count for much that the managers of a business concern are Englishmen, with headquarters in England; that their methods and sympathies are British, and that their interests are centered in this country. These things help to keep business with us, but they will be changed to our permanent detriment should the eagerly sought Morganatic alliance be consummated."

Fairplay, a representative journal of the ship owner in England, takes the most cheerful view of all. It may be said that Fairplay has a very intimate knowledge of the British shipping trade. It says:

"The press is gradually beginning to realize the true inwardness of the great shipping upheaval of which the sale of the famous White Star line to an American trust is the outward and visible sign, but even yet the full significance of the event has not been generally grasped. Still progress in enlightenment has been made and that in itself is a distinct gain. On April 23, the Shipping Gazette was quite cross about the combine and wrote: 'The commerce of the world cannot be dictated to by bodies of this description, however excellent they may be, and however weighty the names of those composing them. It is much better to look facts fairly in the face and recognize that the Americans have stolen a march upon us.' I am not quite sure that we have not stolen a march upon the Americans, who could, if they pleased, acquire the whole tonnage of the United Kingdom on similar terms; but let that pass; between April 23 and April 26 something occurred, and Saul the denouncer became Paul the apologist, for on the latter date the Gazette ceased to pout, and wrote: 'The public may make up its mind that most of the wild suggestions which have been put forward as to the harm which the combination will do to the British flag are founded almost wholly on supposition. British shipping is well able to take care of itself.' As no doubt the 96 per cent. of it remaining after deduction of the transfer to the combine both can, and will, for after all is said and done, the tonnage now being dealt with is less than 4 per cent. of our total tonnage.

"The fact is that the cleverest thing in the whole history of the White Star line is the manner in which its fleet has been landed on the trust, subject of course to existing contracts, either with the government or with other lines. The White Star, in a word, found itself between the devil and the deep sea. With the American railway companies in combination with a trust bent on acquiring that portion of the North Atlantic trade represented by the lines prominently engaged in it, it became a simple question of selling at once or losing money later on; for it is not a question of English shipping fighting American shipping, but of English shipping fighting American railway companies, which in two years could have put as many vessels in the water as they required, regardless of cost, and regardless of profit. How far this position was foreseen by the managers of the ship building and ship owning concerns interested it would be hard to say, but the rate at which that eminent patriot and *deus ex machina* Mr. Pirrie has been providing tonnage in the trade suggests that unless his usual astuteness was at fault he must have looked for something like the present way out for his ventures. If Sir Edward Harland assisted at the birth of the White Star, Mr. Pirrie presides over its obsequies. The line under the late Mr. Ismay had a long and successful career, but once merged in the trust—as an independent line—it will become as dead as mutton. It may fly its flag for a time, and keep its organization so far as the latter may be useful to the trust; but when an American trust acquires a controlling interest in anything, large or small, it means to control that thing in the interest of the group of millionaires who run the show, and not in that of any separate component entity. In order to enter more rapidly into its kingdom the trust has bought a number of boats, some of which it certainly would not now build—neither would anyone else. It will probably in time replace them, and it would not be surprising if Mr. Pirrie were to figure usefully in that business, for it must be many years before American builders can hope to compete with the British yards. In any case American ship building does not, and never can, leave room for profits on the scale demanded by trusts. In the meanwhile, in the betting on the coronation stakes, Mr. W. J. Pirrie's *Peerage* has gone back from evens to 7 to 4."

CHICAGO CORRESPONDENCE.

Chicago, May 21.—The value of vertical lift bridges received a striking illustration on the Chicago river on Thursday last, when five 60-ft. elevated road cars ran past the danger signal and on to the draw of the lift bridge across the river, just as it was opening for the passage of a vessel. The draw continued to rise and the cars stopped and slid back on the track, damaging only the hoods and platforms of the cars. One car was derailed and traffic was delayed only an hour. Nobody was hurt. Had this been a swing bridge the entire train would have certainly plunged into the river, 40 ft. below, and the accident would have been a repetition of the viaduct horror at Cleveland some years ago. Many people have expressed doubts as to the stability of these bridges when opening, or opened, but a train of cars offers a pretty good test and the saving of that train alone was worth the price of the bridge, as the cost of the property, the loss of life, and the blocking of the channel would have figured to an enormous total before it was all settled.

Why don't the Lake Carriers' Association get after the tunnels under the Chicago river? The street railways, the city and the drainage board are all agreed that they should be lowered, but each is trying to saddle the expense on the other. The result has been inaction for three years and it will continue indefinitely unless some body or bodies get together and force action. The attorneys of the Lake Carriers' could surely find a way to get action on the tunnels. Boats are getting stuck on these obstructions so often now that the daily papers no longer think it worth while to chronicle the delay to traffic.

The tugmen's strike is delaying traffic by water to a serious extent here, particularly since the order went out not to tow any boats having contracts with the Great Lakes Towing Co. The line boats are also under the ban and the only boats able to get tugs at all are the schooners; they are moving freely. One result is that captains who formerly thought they must use tugs are now using the river without them and it is thought the bugbear of the current, which made owners think they must have tugs, will have disappeared to a large extent by the time the strike is over, so that less towing will be done as a result of the tie-up. The captains say they are practicing diligently now while the river is practically empty and that many of them will be able to do without tugs in future, even when the river is crowded. They also say that the thing to do is to go towards Twenty-second street in the morning when the current is practically nothing and they can come out to the lake against the current at any time, and about as well as ever. The trouble has always been in stopping when going with the current, without swinging around so as to block the river or hit something. This is obviated by making trips that way in the morning.

Charles E. & W. F. Peck report having the largest business in hull insurance this season that they have ever had, but say that cargo insurance is very light. Added to the scarcity of grain it is found that vessel owners are afraid to send their boats here owing to the tugmen's strike. Several of the brokers estimate that only about 25 per cent. of the business usual in this port is now being done.

The Chicago Yacht Club house was opened for its first meeting May 20. The club has a membership of 400 and they will probably raise the limit to 500. Secretary Fox is now at work upon the new annual, which will contain the addresses of members and the kinds and sizes of the yachts they own. The Warrington Iron Works is building a steam launch for the club, which will be used in carrying its members to and from the club house until the basin, which will be a park some day, is filled up sufficiently so that they can reach the club house by walking.

AROUND THE GREAT LAKES.

Repairs to the large package freight steamer Mauch Chunk, just completed at the works of the Chicago Ship Building Co., amount to about $20,000.

The Bertram Engine Works Co., Toronto, Ont., replying to a letter from the board of trade of London, Ont., say that they are considering the advisability of establishing their branch ship yard at Port Stanley.

Notice is given that a gas buoy, painted black, showing a fixed white light during periods of ten seconds separated by eclipses of ten seconds' duration and marked "South Fox," has been established in about 26 ft. of water on the southerly side of the passage south of South Fox island, two miles south by east from the lighthouse. Also that a second-class nun buoy is established in about 30 ft. of water on the southerly end of the South Fox island shoals, nine miles south by west from the lighthouse.

Supplementary estimates asked for by the dominion government for the year ending June 30, 1903, are $5,739,301. Among the appropriations in western Ontario are $100,000 for improvements in Port Colborne harbor; $5,000 dredging at Amherstburg; $5,000 extension of wharf at Pelee island; $14,000 to complete repairs to piers and for dredging at Port Stanley; $4,500 for new pile protection works and repairs to old work at McGregor's creek (Chatham); $8,200 dredging River Thames, Chatham to Lake St. Clair, and $10,000 repairs to piers and dredging in Rondeau harbor.

The Northern Navigation Co.'s new steel passenger and freight steamer Huronic will make her initial trip from Collingwood, Ont., to Sarnia, on Saturday of this week. The Huronic is constructed of open hearth steel throughout and is 325 ft. over all, 308 ft. between perpendiculars, 43 ft. beam and 27 ft. molded depth. She has triple-expansion engines with cylinders of 26, 42 and 72 in. diameter and a stroke of 42 in. Steam is supplied by four Scotch boilers, 12 ft. 6 in. diameter by 12 ft. long. The new steamer has first-class accommodations for 270 saloon passengers, having a double tier of cabins with outside staterooms.

Another large freight steamer for the Messrs. Hawgood of Cleveland was launched Saturday and named J. M. Jenks. The Jenks is one of two steamers building at Lorain for Messrs. Hawgood. The second boat will be launched in about three weeks and will be named H. B. Nye. The steamer launched Saturday is 434 ft. over all, 414 ft. keel, 50 ft. beam and 28 ft. deep. She will have triple-expansion engines with cylinders of 22, 35 and 58 inches diameter by 40-inch stroke. Two Scotch boilers to be fitted with the Ellis & Eaves induced draft will furnish the steam. The launch was attended by a very large number of friends of the owners from Cleveland and other lake points.

Following is a summary of the cost of constructing, enlarging and improving the system of St. Lawrence river and canal navigation from Montreal to Port Arthur on Lake Superior. The amount expended to date is put down at $66,525,937.71. Of this sum $24,014,340.01 has been put into Welland canal, $4,093,025.60 into the Sault Ste. Marie canal, $8,615,997.65 into Williamsburg canals (of which $4,531,236.06 has been spent on the Gaipus portion), over $11,000,000 on the Lachine canal, over $6,000,000 on Soulanges canal, nearly $7,000,000 on the Cornwall canal, while $2,859,382.28 has been expended on channels in the river, including $1,043,106.49 on the North channel above Cardinal.

NOTES FROM KINGSTON.

Kingston, Ont., May 21.—The biggest vessel that ever went down the St. Lawrence rapids was taken from Kingston to Montreal recently. It was the Richelieu & Ontario Navigation Co.'s steamer Montreal, having a length of 350 ft. and a beam of 60 ft. She was entrusted to Capt. George Botten, pilot.

Fifty men are at work enlarging the big government dry dock at Kingston.

Capt. Augustus has been appointed marine inspector for Inland Lloyds from Kingston to Quebec.

Capt. Henry Wilson of New Orleans is in Kingston. He has just completed the purchase of three upper lake steamers. They will be taken to the coast to engage in the oil trade.

The C. O. Bartlett & Snow Co. of Cleveland has just issued a catalogue devoted to chain belting and sprocket wheels. The company's business is quite varied and includes the making of machinery for oatmeal mills, flour mills, grain elevators, conveying and elevating machinery, fertilizing machinery, cement machinery, paint mills, paint mixers, steam dryers, direct heat dryers, carbon mills, feed mills, shellers, crushers, pearled barley and rolled wheat machinery. The catologue is of 140 pages, is abundantly illustrated and well indexed. The illustrations of the company's conveying machinery are especially fine.

AMERICAN SHIPPING AND SHIP BUILDING.

Mr. William A. Fairburn, naval architect and engineer of the Eastern Ship Building Co., New London, Conn., lectured in a most interesting manner to a large audience at Fitchburg, Mass., a few days ago. His subject was "American Shipping and Ship Building." His views are in many respects unusual and probably will not be generally indorsed, particularly his reference to the use of pneumatic tools. Mr. Fairburn maintains that the only protection needed by American ship builders is the protection which will remove the present handicapping conditions and produce for the ship builder "a fair field and no favor" when brought into competition with the foreigner. Americans can manufacture steel and sell the same at a good profit at a price only 75 per cent. of that of European producers, and yet the present tariff laws require duty being paid on all imported steel. This law should be repealed, and such tariff should be removed from all imported material that can be produced in America cheaper than abroad. He says that the American steel market has no stability; the output is controlled and limited, and the prices are kept as high as the demand and limited supply will permit. Steel has been shipped to Britain and sold there cheaper than to our own ship builders. Plates and shapes have been shipped abroad and sold in Europe at .95 cents per pound, when Americans were obliged to pay in some cases as much as 1.65 cents per pound for the same steel. The American market fluctuates in a ruinous manner, the prices paid for steel of government vessels increasing from 1.20 cents per pound up to 3.40 cents per pound in about four months.

Andrew Carnegie's recent assertion that there is absolutely no patriotism in business is proved and daily illustrated by the business policy of the United States Steel Corporation. If European steel was allowed to enter this country free of duty, the stable British market would have a beneficial governing effect upon the Steel Corporation rates. This should be the first step of the removal of the American ship builders' handicap in the contest for the world's ship construction. When this is done new mines should be opened, new mills built and the demand for steel supplied at a figure allowing for a reasonable profit.

It is time to stop our "spread eagle" talk, Mr. Fairburn says, about the supremacy of American industries and remarkable richness of our mines and steel manufactories, for today all steel construction is retarded and new contracts prevented from taking definite form because of the unsatisfactory limited output of steel material, and the impossibility of obtaining definite promises of delivery before early in 1903. Moreover, all the purchasers of steel material know by bitter experience how much the promises of steel mills are worth. If steel was being sold today in America, with accompanying good deliveries, for the same price as steel is being sold in Britain, namely, 1.50 cents per pound for plates and 1.75 cents per pound for shapes, delivery at yard, or if steel could be imported into our country free of duty, then the United States would see an increase in its ship construction work of fully 35 per cent. over what it now is. Before the United States can compete with Britain in the production of steel vessels it is necessary that it obtain an advantage in the price of material partially sufficient to balance the great handicap of higher cost of labor. If the rates of wages remain as at present on both sides of the Atlantic, vessels could be built in America as cheap as in Europe, provided steel material was delivered promptly in America, and this material sold with the same profit over cost as is the case in Britain. This is assuming that the American ship builder be given an opportunity to specialize and standardize certain types of construction, and that orders be given for vessels in sufficient quantities to warrant such a mode of procedure. At the present time there is probably no yard on the sea coast of the United States—unless it be the Newport News yard with the Morgan ships—that has been called upon to build more than a couple of vessels from the same set of plans, patterns and moulds. The cost of fitting up or plating vessels in America by the universal mould method is much cheaper, and, if judiciously adopted, much better and more rapid than the orthodox British method.

With pneumatic tools, Americans can equal the British hand cost figures for the driving of certain sizes of rivets, and for caulking and shipping, etc., but the cost of the expensive pneumatic plant and tools, and the maintenance of same, in many cases greatly offsets the very slight advantage gained with air power. It is extremely doubtful if the ship yard pneumatic plant is a good investment, for experience has proved that unskilled labor in the majority of cases cannot be employed successfully with these tools, and the initial cost and cost of maintenance is unusually large. The claim that pneumatic tools would permit of the use of unskilled labor and the elimination of the disorganizing hand riveting squads has not been fulfilled in actual practice, and although power riveting is absolutely essential on rivets of large size where a man's muscular force and weight is not sufficient to thoroughly drive the rivets home, yet for ordinary ship riveting when the maintenance and depreciation of air plant are taken into consideration, pneumatic tools fail to produce the pronounced labor saving results that their advocates have prophesied. Therefore, it becomes quite apparent that American ship builders have to pay a great deal more for the riveting of their vessels than do their British cousins. Americans are apt to deceive themselves by comparing some of our best results gained with pneumatic tools against standard British prices, ignoring the fact that odd work, the more difficult work, and cost of pneumatic plant, changes the results greatly, and gives the British ship builder a great advantage in the comparison.

American ship builders save in the cost of production when compared with the British only in labor saving devices, and wherever unskilled labor and muscular force is required Americans suffer greatly in comparison, on account of the great difference in the rates of wages in the two countries. The methods of handling material in American ship yards, the crane service over building berths, etc., all tend to give Americans a slight advantage, but all these things as well as the universal method of mould construction, pneumatic tools, etc., are being gradually copied abroad, and unless Americans devise some superior labor saving devices, the present advantages that they are now gaining by their ingenuity will be lost.

The labor question in American yards is a serious proposition. In Great Britain the trade unions are strong and composed of good mechanics who are compelled to serve an apprenticeship. Usually strong men control the situation, and by tact and good judgment avoid foolish unnecessary labor troubles. (We believe Mr. Fairburn speaks too optimistically of labor troubles in Great Britain. In our opinion there is no country so union-ridden as Britain.—Ed.) In America, the labor unions are generally controlled by inferior ignorant men, and while these unions have all the disadvantages of the British societies, they have none of their advantages. Men after working a few months in a ship yard are permitted to join the union, and straightway attempt to dictate in the general policy and management of the ship yard. The great demand for practical ship builders in American yards, and the small supply to meet this ever-increasing demand, is responsible today for the inferior, incompetent floating class of so-called mechanics who are a source of great trouble and disgrace to American ship building, as well as to the older competent mechanics who built American vessels a few years ago. It is time to revive the old apprentice system, treat the boys as they were treated fifteen years ago, and with no pull or favoritism let the youths know that their only chance for advancement depends upon the possession of merit and the actual assertion of ability. Too many young men want to be draughtsmen before they can blue print or trace; naval architects and engineers without being draughtsmen and without having had any yard experience. It is time that we trained young men for fitters, riveters, chippers and calkers, carpenters, etc., for these trades pay very good wages, and these occupations should be filled by intelligent American mechanics.

Ship fittings and auxiliary machinery can be bought in America today cheaper than in Europe. Firms who manufacture the same apparatus on both sides of the Atlantic frequently affirm that the cost of production in America is less than in Britain. If water-tube boilers, windlasses, capstans, steering gears, winches, electrical apparatus, machine tools, stationary engines, etc., can be built in America cheaper than in Europe, why is it that the propelling machinery of a steam vessel costs in America today about 40 per cent. more than it does in Britain? One of the principal reasons for this state of affairs is apparently the lack of standardizing, for American marine engine shops seldom build several engines from the same patterns, and standardizing in marine work is practically unknown. Moreover, American shops are usually disorganized on account of merchant and naval work undergoing construction simultaneously, and too many naval fads and expenses creep into what should be a more rugged merchant construction. American builders also frequently use superior materials, adjust and fit more carefully, have better finish, and in their cheapest work rival in quality of production European high-grade output. There is not an engine building company on the American sea coast that can build a cheap tramp steamer engine. Moreover, American owners, although appearing satisfied when buying British vessels, are never satisfied when American builders attempt to duplicate the British in the line of economies. There appears to be an unwritten law that American-built vessels shall have a superior equipment, both as regards hull and machinery, and this fact alone frequently handicaps American builders. The best paying vessel and the most successful for the owner is the one that has the greatest money-earning power with the smallest initial cost. Fittings and items of equipment may produce increased economy, but the cost of maintenance, handling, and the initial cost may be such that they fail to pay sufficient interest on the investment to warrant their adoption. If American ship owners insist upon a higher class of ship construction than their British cousins, then they must also be reasonable in this matter and expect to pay more for the construction of their ships. The difference in actual cost between similar vessels built in Europe and in the United States at the same time is an interesting subject, and one on which it is very difficult to obtain authentic information. About seven years ago the St. Louis and St. Paul were built in an American yard at a price said to be 27.5 per cent. over a Scotch bid submitted. The large Atlantic transport ships, now building at Camden, N. J., are to cost, it is stated, 30 per cent. more than the sister ships built by Harland & Wolff of Belfast, Ireland, and the smaller class of vessels, building in two American yards for the same owners, it is understood, will cost 36 per cent. more than similar vessels built in a British yard. If these figures are authentic, the American ship builders are certainly very severely handicapped at the present time, and when to this question of increased price is added very unsatisfactory delivery, due to unsatisfactory material, markets and lack of skilled labor, the handicap seems sufficient to crush and trample down indefinitely the possibility of the demand for construction of American ships for foreign service.

Mr. Fairburn does not think that the record made by American ship building up to date in the economical construction of vessels should be considered a fair criterion for comparison and final judgment. American yards have been greatly handicapped, enthusiasm has in many cases overbalanced good judgment. All classes of vessels have been built in almost every yard; torpedo boats, tramp steamers, steamboats, armor clads and yachts have been built simultaneously side by side by practically the same staff in the same yard. American ship builders are now emerging from a trying transition period. They have, under most trying circumstances, given pronounced evidence of their indomitable pluck and grit, but it is probably an undisputed fact that a more conservative business policy would have ultimately proved much better for the majority of ship builders and for American ship building. As long as naval work is responsible for the construction of ship building plants and the maintenance of same when in operation, the United States can never hope to be seriously considered a worthy competitor of European merchant ship builders. I do not wish to disparage the building of the new navy. I am a strong advocate of the construction of a fleet that will be in keeping with America's prestige, wealth and power, but if war vessels and merchant vessels continue to be built side by side, and in the same shops in American ship yards by the same men and with the same methods as at present employed, then Europeans need not worry about American competition for many years to come. At the present time, however, the demand for merchant ship construction is so limited, that were it not for the government construction, there would not be work enough in the country to keep one-half of the present number of our ship yards busy. As long as the present limited demand for merchant ships continues, it is very desirable that all government work be built under private contract, and it will always be possible for the United States government to contract for vessels with private builders cheaper than they can build the vessels themselves in government navy yards. As soon as the demand for merchant ship construction permits, however, Mr. Fairburn advocates that certain Ameri-

can ship yards make a specialty of this government work, or else divide up their plant into different departments.

The United States is now the world's greatest exporter, as well as the greatest trading nation on the face of the globe, and yet it has practically no merchant marine engaged in foreign commerce, and the total tonnage of its floating property is only one-fifth of that of Great Britain, and only about equal to that of Germany. Is it not time that American ships carried American products to the markets of the world? Is it not time for the American people to protect their export trade by encouraging the building of a merchant marine that will be independent of foreign influences? The American trade invasion is alarming the nations abroad, and foreign legislative methods may be adopted that may seriously cripple our foreign trade. Other countries are fast becoming great producers of food and raw materials, also of manufactured goods, and if Americans are compelled to ship their product to the world's markets in their competitors' ships, how great will be the handicap?

The time is ripe for congress to substantially encourage the construction of an American merchant marine which will control American exports, increase sea power, develop the ship building industry, and make the United States, as a great nation should be, independent, powerful and self-reliant. As its merchant marine increases, so will its foreign markets and the demand for American goods, and as the demand for its product increases, so does the prosperity of the entire country increase. If foreign markets should be closed today, the result would be a hopeless glut in production, stagnation of manufactures, strikes, panics, and general prostration of industries and trade. The prosperity of the United States as a nation depends upon the expansion of its foreign commerce. As before stated, American ship builders need protection only to bring them on even terms with their foreign competitors. American ship owners are handicapped in operating their vessels just as much as the ship builders are in building them. It is said that the rate of wages paid the crews of the American transatlantic line is 25 per cent. more than the British, whereas the German rates are 32 per cent. less than the British.

A well planned ship subsidy bill is essential, for the maritime welfare of the country depends upon it, and the continued prosperity of the entire nation likewise depends upon it. Such a ship subsidy measure, once adopted, would give American ship builders the opportunity that they are waiting and longing for. America has the yards and the men to manage them; give these yards and men the work, the proper kind of work and the required quantity of it, and in a few years, with appropriate legislative assistance and the proper attention bestowed upon its steel markets, etc., the Americans will lead the world as the builders of the best, most economical and cheapest merchant vessels.

Mr. Fairburn believes thoroughly in the doctrine of the survival of the fittest. American ship builders are destined to lead the world in economical construction and output, as well as in quality and originality, but they can never take their true stand until they are given an opportunity to work unhandicapped, and with the same encouragement and opportunities as are given their foreign competitors. That congress should promptly adopt effective methods to encourage and foster American ship building and the American merchant marine, ought to be the earnest desire of every thinking patriotic American.

SHIP BUILDING ON THE DELAWARE.

Philadelphia, May 21.—The launching of the steamship Nebraskan took place last Monday from the works of the New York Ship Building Co., Camden, N. J. The ceremony was a private affair and only a few spectators were present. Mrs. Henry G. Morse, wife of the president of the ship building company, christened the new vessel. The Nebraskan, which is a sister ship to the Nevadan, is 271 ft. long, 46 ft. beam, 34.8 ft. depth of hold and has a tonnage of 5,500. Her contract speed is 13 knots. The Nebraskan is for the American-Hawaiian Steamship Co. and is intended for the Pacific merchant carrying trade.

The American-Hawaiian Co. has determined to convert all of its ships now in commission into oil burners and will withdraw them, one by one, until the change is completely effected. The experiments in this line with the vessels now under way at the New York Ship Building Co.'s works have been eminently successful. This was notably the case in the reconstructed tanker J. M. Guffey, which is now in service between Sabine Pass, Tex., and Philadelphia. On her trial trip in the Delaware bay and river this vessel made a wonderful showing from a fuel economy standpoint. During these experiments and in those now in progress on the Nevadan, particular attention has been given by the experts to the effect of the oil flames on the boiler sheets and tubes. It is said that with oil fuel there is practically no deposit. The tubes were clean swept after fourteen hours' steaming and it is believed they will show greatly increased longevity under the new conditions.

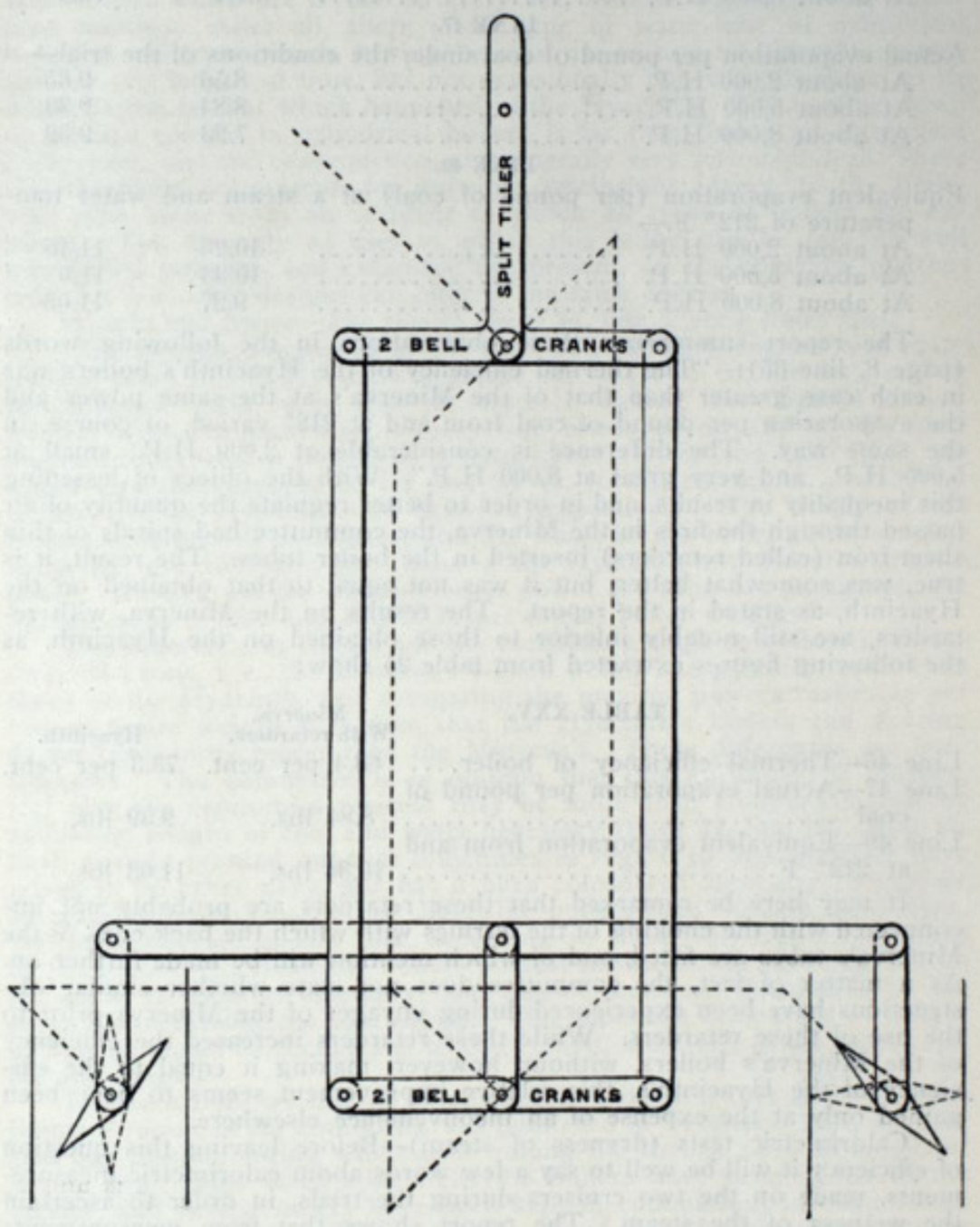
The auxiliary schooner Apriadne, building in the Harlan & Hollingsworth Co.'s ship yard at Wilmington, is due to be launched tomorrow. The vessel is a handsome craft, measuring 140 ft. over all, with a waterline of 110 ft. Her beam is 26 ft. and her draught 14 ft. The model of the new vessel is almost the same as that of the yacht Endymion. The Apriadne is expected to make 8 knots under auxiliary power, for which she has compound engines and water-tube boilers, but she will make her best cruising passages under the wide spread of canvas which has been allotted her. On her first voyage she will double Cape Horn on an extended cruise.

The Delaware River Iron Ship Building Co., otherwise the Roach yard, at Chester, Pa., has the keel well down for the new passenger and freight steamship ordered by the New York & Cuba Mail Steamship Co. This contract is one that was particularly desirable, not only to the builders but to the entire city of Chester as well. It is a matter of general congratulation that the Ward line has returned to the Roach yard for another vessel after having abandoned it for so long a period. It is said in this connection that the Roach yard was awarded the contract largely in recognition of the wonderful record of the steamship Niagara, built there for the Ward line a quarter of a century ago. This craft was recently overhauled and marine engineers and ship builders all over the Atlantic seaboard were amazed that the old steamship evinced so few marks of the ravages of time. A notable instance was that of the shaft, no section of which has been renewed since it was placed in the vessel's hold, and her timbers are as sound as on their first survey.

Marked progress is being made at the Cramp works on the new battleship Maine. Contrary to the pessimistic opinions so freely expressed only a few weeks ago, the delivery of armor plate for this formidable craft has been rapid and there has been no material delay arising from this source. The engines and boilers are practically installed and it can be confidently predicted that the builders' trial will have been run before the end of the present year. The Cramp company is prepared to bid on the next contract for battleships and will undoubtedly be represented among the builders. Their present most active work is in finishing up the American liner Kroonland, which is scheduled to sail on her first voyage from New York the latter part of next month. The new Clyde line steamship is also well under way and it is expected that quite a record will be made in her construction.

STEERING GEAR FOR TWIN-SCREW SHIPS.

Mr. V. de Michele of Higham, Rochester, England, has introduced a new steering gear for twin-screw steamers. It is shown in the accompanying engraving. Its object is to avoid the loss taking place due to its retarding effect when an ordinary rudder is used, and also, it is said, to render unnecessary the use of steam steering gear under ordinary sea conditions. Under this system the steersman has control over the admission of steam to the engines, the whole being done direct from the bridge without any signalling to the engine room. It will be seen by glancing at the illustration that the tiller is connected by means of two systems of bell cranks and links to two throttle valves placed in the main steam pipes going to the two engines. The valves are so designed that when they are half open the engines are running at their normal speed, and the gear never closes them so far as to entirely stop the engines. The tiller is split horizontally, the upper half controlling one valve and the lower half the other. Ordinarily when steering these two halves are held together by a



pin dropped through holes in either of them. When the tiller is held centrally an equal amount of steam is being given to both engines, that is to say, that the throttle valves are equally opened. If, however, it is moved to one side or to the other, one valve tends to close, and the other to open, with the result, so it is claimed, that the steering is performed with great accuracy. The pin holding the two portions of the tiller together can be removed if required, and then the two halves of this tiller can be thrown over, the one in one direction and the other in the other. According to the way they are thrown, this will either result in the valves being both thrown further open, or both nearly closed, thus increasing or reducing the speed of the vessel. The engineer is to have control in starting, stopping and regulating the engines; the steersman can only influence their running relative to each other. We can hardly imagine, however, that the proposal is likely to meet with approval from naval engineers. To have anyone but themselves altering the speed of their engines is, we think, likely, on the other hand, to meet with their strongly-expressed disapproval.

The new station steamboat New Jersey, now under construction at the works of A. C. Brown & Sons, Tottenville, Staten Island, for the New York & Sandy Hook Pilots' Association, will be launched on May 30. The New Jersey is a wooden vessel built under the supervision of Capt. John Phelan, the treasurer of the association, at a cost of $75,000. She will be equipped with wireless telegraphy apparatus. The new boat is 155 ft. long, 28 ft. beam and 19 ft. deep. She will have compound engines of 600 H.P. and a speed of about 14 knots. Her tonnage is 520 tons.

REPLY TO THE BRITISH ADMIRALTY.

LETTER OF DELAUNAY BELLEVILLE & CO., OWNERS OF THE BELLEVILLE WATER-TUBE BOILER PATENTS, TO ENGLISH NAVAL OFFICIALS ON THE SUBJECT OF THE BOILER COMMITTEE REPORT.

A letter from Delaunay Belleville & Co., owners of the Belleville water-tube boiler patents, to the British admiralty on the subject of the trials of the cruisers Hyacinth and Minerva, the former fitted with Belleville water-tube boilers and the latter with Scotch boilers, adds another interesting chapter to the extended discussion of the boiler question in the British navy. The letter is as follows:

We have the honor to submit to your notice the following observations which have occurred to us in reading the recent report by the committee on water tube boilers on the trials of the cruisers Hyacinth and Minerva. We will be obliged to you if you will kindly place these observations before the lords commissioners of the admiralty:

Efficiency of the boilers—It appears to us of the greatest importance, in view of the controversies which have raged in print on the subject of the efficiency of Belleville boilers, to, in the first place, point out the fact that the committee recognize that these boilers show greater economy than the boilers under comparison with them. The figures in lines 46, 47 and 49 of table 25, annexed to the report, leave no doubt on this point. We give them below:

TABLE 25, LINE 46.

Thermal efficiency of the boilers—	Minerva.	Hyacinth.
At about 2,000 H.P.	69.7	77.2
At about 5,000 H.P.	68.0	71.8
At about 8,000 H.P.	61.4	73.3

LINE 47.

Actual evaporation per pound of coal under the conditions of the trial—		
At about 2,000 H.P.	8.56	9.65
At about 5,000 H.P.	8.84	9.33
At about 8,000 H.P.	7.93	9.39

LINE 49.

Equivalent evaporation (per pound of coal) at a steam and water temperature of 212° F.—		
At about 2,000 H.P.	10.26	11.46
At about 5,000 H.P.	10.33	11.0
At about 8,000 H.P.	9.27	11.03

The report summarizes these observations in the following words (page 8, line 35): "The thermal efficiency of the Hyacinth's boilers was in each case greater than that of the Minerva's at the same power and the evaporation per pound of coal from and at 212° varied, of course, in the same way. The difference is considerable at 2,000 H.P., small at 5,000 H.P., and very great at 8,000 H.P." With the object of lessening this inequality in results, and in order to better regulate the quantity of air passed through the fires in the Minerva, the committee had spirals of thin sheet iron (called retarders) inserted in the boiler tubes. The result, it is true, was somewhat better, but it was not equal to that obtained on the Hyacinth, as stated in the report. The results on the Minerva, with retarders, are still notably inferior to those obtained on the Hyacinth, as the following figures extracted from table 25 show:

TABLE XXV.	Minerva. With retarders.	Hyacinth.
Line 46—Thermal efficiency of boiler....	68.4 per cent.	73.3 per cent.
Line 47—Actual evaporation per pound of coal	8.84 lbs.	9.39 lbs.
Line 49—Equivalent evaporation from and at 212° F.	10.34 lbs.	11.03 lbs.

It may here be remarked that these retarders are probably not unconnected with the choking of the ferrules with which the back ends of the Minerva's tubes are fitted, and of which mention will be made further on. As a matter of fact, the committee does not state whether similar obstructions have been experienced during voyages of the Minerva prior to the use of these retarders. While these retarders increased the efficiency of the Minerva's boilers, without, however, making it equal to the efficiency of the Hyacinth's, this relative improvement seems to have been gained only at the expense of an inconvenience elsewhere.

Calorimetric tests (dryness of steam)—Before leaving this question of efficiency it will be well to say a few words about calorimetric measurements, made on the two cruisers during the trials, in order to ascertain the wetness of the steam. The report shows that from measurements made by a Carpenter calorimeter on the Hyacinth at less than 8,000 H.P., the wetness was so small that its average value was negligible (page 10, line 60), but that when the horse power was between 8,000 and 10,000 the proportion of water indicated by the apparatus as contained in the steam was 4.7 per cent. and 6.4 per cent. respectively (ib. line 63). On the Minerva, on the contrary, the steam at these different horse powers was found to be practically dry. As a general rule calorimetric observations are of an extremely delicate nature, but one may be certain that the readings of the instrument give results here which cannot be correct. In the first place, different positions were chosen in the Minerva and Hyacinth for making the connections between the calorimeter and the steam to be tested. In the Minerva the calorimeter (page 6, line 14) was connected to the steam pipe between the regulating valve and the high-pressure valve chest of the port main engines; in the Hyacinth it was connected to the steam pipe in No. 5 stokehold on the boiler side of the separator. To render the results comparable it would have been necessary in the Hyacinth to make the connection near the high-pressure valve chest, as was done in the Minerva, for it is there only that the steam, purified in the separator, and wire drawn in the reducing valve, is in the condition in which it is used in the engines. The calorimeter test of the steam in the Hyacinth was therefore made under decidedly unfavorable conditions.

Moreover, there is a contradiction between the statement that the steam in the Hyacinth showed more wetness at powers between 8,000 and 10,000 H.P., and the fact that these very horse powers are the only ones at which the Hyacinth's engines showed greater efficiency than those of the Minerva. This fact would be inexplicable if the amount of water carried over from the Hyacinth's boilers during the trials did in fact attain the proportions indicated by the calorimeter, for it is well known that on the contrary the efficiency of the engines very sensibly diminishes in proportion as the steam is wetter. In short, table 25 proves more clearly still, if it is possible, that the quality of the steam of the Hyacinth's Belleville boilers at horse powers of from 8,000 to 10,000 is not inferior to that of the Minerva's boilers. This table allows of the comparison, as regards the two vessels, of the temperature corresponding to the pressure in the valve chest of the high-pressure cylinder, and the temperature actually observed in this chest. These are the figures given in lines 9, 10 and 13, of table 25—first for the Minerva:

Line 9—Mean pressure by gauge on the high-pressure valve chest	136 lbs.
Line 10—Corresponding temperature of saturated steam	358.5° F.
Line 13—Mean observed temperature in high-pressure valve chest	345° F.
Fall of temperature	13.5° F.

Following are the figures for the Hyacinth:

	8,000 H. P.		10,000 H. P.
		With exhaust.	
	Closed.	Open.	Open.
Line 9—Mean pressure by gauge in high-pressure valve chest	194 lbs.	192 lbs.	220 lbs.
Line 10—Corresponding temperature of saturated steam	385.1°	384.3°	395.4°
Line 13—Mean observed temperature in high-pressure valve chest	391.6°	389.1°	394.1°
Excess of temperature	6.5°	4.8°	.....
Fall of temperature	....	....	1.3°

Therefore, in the Minerva with 8,000 H.P., the thermometer indicates a fall of temperature of 13.5°, as compared with the temperature corresponding to the gauge pressure, while in the Hyacinth, at 10,000 H.P., this difference is only 1.3°, and at 8,000 H.P. there is, on the contrary, a gain of 4.8° and 6.5°. The figures for the Hyacinth given in this table undoubtedly show the steam to be perfectly dry, which is entirely in agreement with the greater efficiency of the engines at that horse power.

Losses of Water—The report (page 11, line 4, etc.) contains the following remarks on the question of loss of water: "The loss of steam through leaks in boilers, steam pipes, engine stuffing boxes, etc., is given in table 25, line 42. It is, of course, impossible to apportion the losses to their various causes, but the results of the Gibraltar runs lead us to look upon leaks at the boilers as being responsible for any abnormal increase in these losses. On the three progressive trials of the Minerva, the total losses were represented by 2.1, 3.0 and 3.7 tons of water per 1,000 H.P. per 24 hours respectively. In the Saxonia the figure was 2.76 tons. In the Hyacinth they were 5.5, 2.9 and 5.5 tons respectively, and 4.8 tons at 10,000 H.P. The irregularities here no doubt depend mainly on the actual tightness of the boiler joints during the runs. At 5,000 H.P. the Hyacinth's losses came out very well, and slightly less than those of the Minerva at the same power; at the other powers, both lower and higher, they were very much greater, and it was found later on, during the Gibraltar runs, that on trials of greater duration they became most serious."

Thus during the trial at 5,000 H.P. the losses of water are a little less in the Hyacinth than in the Minerva; during the trials at 2,000 and 8,000 H.P., the losses are greater; on the runs to Gibraltar the losses are much more serious. Attempt was made at Gibraltar and again at Portsmouth to discover the nature of the leaks which occasioned these losses; it does not, however, appear to have been clearly recognized at first. On the voyage out to Gibraltar a sudden slackening of speed, due to fog, had resulted in greater losses, and it was supposed that the cause might be the increase of pressure. On a special run over a free route, made during the stay at Gibraltar, the same conditions of sudden slowing down were voluntarily reproduced, with the result that the safety valves blew freely, but the tests made did not show any appreciable difference between the amount of water lost before and after the slowing down (page 18, line 50). The importance of the losses, therefore, had no visible connection either with the speed of the engines or with the pressure in the boilers, and the question seemed involved in a certain mystery, which has been exploited to the detriment of Belleville boilers in the polemics to which the Hyacinth and Minerva trials gave rise. The question is now clearly elucidated by the experiments made with two of the Hyacinth's boilers at Devonport in December, 1901. The losses of water were measured with these boilers at first in the same state in which they were at the time of the return of this cruiser from sea service. These measurements were made during six consecutive periods of 24 hours each. The examination of the boilers showed that the losses were due exclusively to leaks in the joints of the handhole doors of the junction boxes, the faces of which did not bear truly against each other, while the asbestos rings were of irregular thickness and defective composition. The joints were re-made under more normal conditions, and, in a new trial, covering, like the former, a period of six times 24 hours, it was found that the loss had been reduced to less than one-tenth of its former amount. The question was thus reduced to its true proportions and placed on its proper footing. We now know which were the leaky joints, and what steps are necessary to avoid such leakage. It is at present purely a question of practice, the solution of which will daily become more certain and more easy in proportion as the staff, whose attention is now awakened in the right direction, acquire more experience, and the materials prepared for the joints are better fitted for their purpose.

This elucidation, the result of the Devonport experiments, makes it easy to understand why the question of losses of water with Belleville boilers has arisen in no other navy although every day ships of all sorts fitted with Belleville boilers accomplish on every sea voyages which are much longer than the run from Portsmouth to Gibraltar, thereby proving that, contrary to the opinion of the committee (page 23, line 39), water leakage is not inherent in the very design of these boilers. It is equally well known that it has not been judged necessary in any navy in which Belleville boilers are used to take any special precautions on their account, either as regards the supply or the production of fresh water. In France, for example, the apparatus fitted for producing fresh water is calculated on the same base (4 tons of water per 24 hours per 1,000 H.P.), whether the boilers in question are Belleville, water tube of other types, or cylindrical. These plain facts and results of multiple and prolonged experiments over so many fields of action ought in justice to be taken into consideration. They admit of the conclusion that the losses of water experienced during the voyage to Gibraltar are due to causes practically

avoidable, and that there are no grounds for drawing therefrom the general consequences the committee have thought it their duty to deduce. The ships of all classes and all nationalities which navigate on far distant stations, the mail steamers which are daily plying on the South American lines as well as those of Australia and the far east, undoubtedly prove that the tightness of Belleville boilers on the longest runs and the most prolonged and rapid voyages is a practical and certain fact.

Radius of Action—This question of water loss which, in spite of the numerous and well known facts which we have just mentioned, is treated in the report as inherent in this design of boilers, led the committee to conclude that the Hyacinth's radius of action was limited, not by her coal consumption but by her consumption of water. But water loss is an abnormal condition and may be avoided; we have just demonstrated this and there is no need to go over the ground again. Consequently in order to ascertain the true radius of action of the Hyacinth, or of a similar ship fitted with Belleville boilers, it is necessary to consider what this radius should be, having regard to the relationship between the amount of coal consumed and the coal capacity of the bunkers, eliminating as far as possible all factors not connected with the boilers, since it is the question of boilers alone which is here under discussion. But let us take first the bare figures given in the report. The Minerva at 7,000 H.P. ran 2,640 miles and burnt 977 tons of coal (page 17, lines 30 and 31). The Hyacinth ran 1,810 miles and burnt 676 tons of coal (page 16, lines 63 and 49). Such are the material facts. On comparing these figures it will be seen that the Hyacinth by burning the same quantity of coal as the Minerva, namely 977 tons, would have run $1{,}810 \times \frac{977}{676} = 2{,}616$ miles. Therefore, comparing the radii of action corresponding to the same amount of coal burnt, the Minerva has an advantage of only 24 miles over the Hyacinth; that is to say, less than one per cent. This difference is almost insignificant in itself, but we shall see that if the two types of boilers had been fitted in conjunction with engines and hulls of the same efficiency all the advantage would then have been with the Hyacinth's boilers and would be proportionately greater. As a matter of fact, it is found that the efficiencies of the engines and hull of the Hyacinth were actually such as to diminish the radius of action of this cruiser in comparison with that of the Minerva.

As far as the main engines are concerned the report shows that the thermal efficiency was greater in the Minerva than in the Hyacinth—16.7 per cent., instead of 15.1 (page 13, line 34). This is a difference of 10 per cent. to the detriment of the Hyacinth, which, all other things being equal, would have had her radius of action increased in the same proportion if the same power had given the ship the same speed. But the influence of the hull here again makes itself felt, for at the same powers the Hyacinth developed less speed than the Minerva; and this difference was very considerable. The report (page 18, line 22, etc.) gives the following important information on this subject:

"In reference to the speed of the two ships, it was seen from the start, both vessels working at the same power, that the Minerva was the faster vessel. This result, however, to whatever cause it may be due, had nothing to do with the question under consideration by the committee, and is in accordance with the contractor's trials, of which all the figures (a summary is given below) have been before the admiralty for some time:

Hyacinth.		Minerva.	
H. P.	Speed (knots.)	H. P.	Speed (knots).
2,146	12.10	4,919	17.52
7,678	17.34	8,216	19.60
10,447	19.40	9,902	20.34

"These figures appear to be also in entire agreement, so far as the Hyacinth is concerned, with the results of the special trials of that ship made in Stokes bay in 1900."

According to the foregoing extracts from the committee report the Minerva was faster at 4,919 H.P. than the Hyacinth at 7,678 H.P., 17.52 knots instead of 17.34. Is it not strictly equitable, in order to strike a fair comparison, from the boiler point of view only, that allowances should be made for elements whose influence is so considerable. We do not insist on the fact that the Hyacinth had at her disposal on the run to Gibraltar only 968 tons of coal, while the Minerva had 1,016 tons in her bunkers, i. e., 48 tons or 5 per cent. more (page 15, line 48). If the two ships had been obliged to use all their coal the Minerva's radius of action would then have apparently been increased by 5 per cent., and in fact the Minerva's trial was closed before her coal was exhausted, but after she had already burnt 977 tons, or more coal than the Hyacinth had in her bunkers at the start. The conclusion drawn from the comparison of the radii of action of the two ships was on this account rendered misleading at the outset, for the object of the trial was to compare the powers of the boilers and not the bunker capacities of the two ships. In short, the gross results of the Gibraltar run at 7,000 H.P. make out the Hyacinth's radius of action to be 1 per cent. less than the Minerva's, while if these results are looked at from the boiler point of view only, and allowance is made for the fact that the Belleville boilers were being used with less efficient engines, a slower hull and a smaller bunker capacity, it is found that the advantage is very greatly in their favor.

Choking of Ferrules of the Minerva's Tubes—The inferiority of the Minerva's boilers from the point of view of radius of action, was not only due to their large coal consumption, in spite of the use of retarders, but also to the gradual choking of the ferrules of the tubes by "bird-nesting," which was in all probability encouraged by retarders being used. Indeed, the committee state (page 17, line 50, etc.) that in order to maintain the 7,000 H.P. on the Minerva it was necessary to gradually increase the air pressure to six times its former amount (1.50 in. instead of 0.25 in.), because of the gradual choking of the ferrules, and even with that during the last seven hours of the trial the power could not be fully maintained. "The openings in the ferrules were found, on examination at Gibraltar, to be choked up across half or three-quarters of their area by a thick hard brown slag, which also coated the surface of the tube plates, and which was not removed until access was gained, after cooling, to the combustion chambers"—(page 18, line 3). This circumstance shortened the duration of the trial, although the Minerva had still 39 tons of coal in her bunkers (page 17, line 58). Chokings of a similar nature also took place on the run home and on arrival at Portsmouth (page 23, line 51) the ferrules in all the boilers were found partially closed with "bird's-nesting" similar to that found at Gibraltar, though not so badly, on account of the lesser duration of the run.

The committee (page 18, line 15) state their opinion that in practice the obstructions would not have appreciably delayed the ship beyond the time necessary for coaling. We may, however, be permitted to point out that the Minerva (page 19, line 10) arrived at Gibraltar during the night of July 12-13, at 12:30, and that it was not until the forenoon of the 14th (ib. line 13), that is 16-17 hours afterwards, that the boilers were sufficiently cool for men to work in the combustion chambers and to commence to remove the deposits adhering to the tube plates and ferrules. The time spent on cleaning these parts is not stated, but considering the adhesive nature of the deposits and the fact that they were not confined to the ferrules, but extended over the whole surface of the tube plates (page 18, line 5), the total time occupied in cooling the boilers and in cleaning was certainly much greater than that to which, in case of necessity, a ship of war can reduce the time required for coaling. In short, the obstructions were, after only 150 hours steaming, sufficiently serious to prevent the power from being maintained, and to necessitate the abandonment of the trial while the ship still had coal available in her bunkers. These facts bring to light a serious fault as regards the Minerva, for in practice ships of war or commerce have frequently to make runs of much longer duration than 150 hours.

Circulation and Water Levels—During the run home from Gibraltar a tube burst in one of the eighteen boilers of the Hyacinth. The report, in touching on this, reiterates the apprehensions and criticisms already formulated in the interim report of Feb. 19, 1901, on the untrustworthiness of the water gauge indications and the defective circulation which, in the opinion of the committee, are the characteristic features of Belleville boilers. For our part, we can only repeat the observations on these points we had the honor of laying before the admiralty in our letter of March 28, 1901. The fact that a tube burst during the trial in question cannot nullify the results obtained every day with the innumerable Belleville boilers which are in use on every sea, beneath the flags of all maritime nations. After all, there is no type of water-tube or cylindrical boiler in existence which, having been in use to any considerable extent and for any length of time, has not occasionally met with accidents to its tubes similar to that which happened in the Hyacinth. The coming down of furnace crowns in cylindrical boilers is far from being an infrequent occurrence, and the consequences are generally very serious indeed. There are, therefore, no grounds for drawing conclusions adverse to the Belleville type alone from an accident to which all types of boilers are exposed. The diversity of uses to which this boiler can be put, its well established position, and extensive use present, on the contrary, guarantees that few other designs can offer to the same degree.

Weight and Space—The report (page 14, line 3, etc.) states that:

"The net space occupied by the main and auxiliary engines and evaporating plant in the Hyacinth is 28,200 cu. ft. (798.5 cu. metres), and in the Minerva 29,240 cu. ft. (828 cu. metres). Taking these figures in connection with the maximum horse power measured on any of the committee's trials over a period of several hours (10,180 and 8,657 H.P. respectively) they amount to 2.8 and 3.4 cu. ft. (79 cu. decim. and 96 cu. decim.) in the Hyacinth and Minerva respectively. The weight of the boilers with funnels and water, and the whole of the boiler room weights generally, are 453.8 and 557.4 tons in the Hyacinth and Minerva respectively. Worked out on the same horse power as in the last paragraph, the figures come to 22.4 and 15.5 H.P. per ton of boiler weights."

The difference in weight for the complete groups of boilers is therefore 103.6 tons, i. e., the Minerva's boilers weigh 22.8 per cent. more than those of the Hyacinth, and comparing the maxima powers realizable per ton of boiler weight it is seen that the Hyacinth's boilers can develop 44 per cent. more power than the Minerva's. These differences are considerable. The committee is of opinion that this advantage is illusory, and that the economies realized may be more than counterbalanced by additional weight of coal and water necessary (page 14, line 18). But we have already pointed out that difficulties in regard to loss of water have arisen in no other navy, nor has it been considered necessary to provide for greater water reserves for Belleville boilers than for any other type. We have likewise shown that, according to these very results obtained by the committee, Belleville boilers possess incontestable advantages from the point of view of efficiency, and cannot therefore themselves be the cause for increasing the coal supply. The important economies of weight and space shown by them stand to their credit, therefore, as an incontestable advantage.

In conclusion, we beg to be allowed to point out that since the preliminary report of the committee was published in February, 1901, a whole year has elapsed, during which time, taking the British navy alone, about fifteen large ships fitted with Belleville boilers have been added to the service, and twenty others have been kept in commission in distant seas or in active squadrons. The increasing use of these boilers appears to us not to confirm the fears of the committee, but, on the contrary, to show that in the British fleet, as in all others, these boilers daily justify more and more the confidence reposed in them. And, to mention only the earlier cases in which these boilers have been fitted by the admiralty, the cruises of the Powerful and the trials carried out some months back by the Terrible have shown that Belleville boilers, after six years of use on board, and after long cruises in distant seas, are always capable of rendering the best and most reliable service, and have lost nothing of their power and usefulness.

In connection with the Olympian games scheduled for Chicago in the fall of 1904 it has been suggested that a naval pageant be held, the purpose being to demonstrate that the lakes are capable of being navigated by ocean-going craft. This sounds bigger than it really is. The vessels which could reach Chicago from the ocean in 1904 would be limited in size to the dimensions of locks in the Canadian canals. The average length of a Canadian canal steamer is 250 ft., the canal not permitting the passage of a steamer of greater beam than 43 ft., and length must always bear a certain ratio to beam. The tendency of the ocean carrier is to greater and greater draught; and therefore the lakes will never be seaports in a commercial sense until the St. Lawrence river canals have far greater dimensions than they have at present. The pageant would be interesting and entertaining, but not valuable.

The new issue of Dominion Iron & Steel Co.'s stock has all been underwritten.

CENSUS RETURNS REGARDING SHIP BUILDING INDUSTRY.

A bulletin dealing with the ship building industry in the United States has just been issued by the census bureau. This bulletin was very briefly referred to in the last issue of the Review. Liberal extracts are now made from it. The reports of the twelfth census, year 1900, show a capital of $77,362,701 invested in the 1,116 establishments throughout the United States not including establishments owned by the government. This sum represents the value of land, buildings, machinery, tools, and implements, and the live capital utilized, but does not include the capital stock of any of the corporations. The value of the products is returned at $74,578,158, to produce which involved an outlay of $2,008,537 for salaries of officials, clerks, etc.; $24,839,163 for wages; $3,685,661 for miscellaneous expenses, including rent, taxes, etc.; and $33,486,772 for materials used, mill supplies, freight and fuel. It is not to be assumed, however, that the difference between the aggregate of these sums and the value of the products is, in any sense, indicative of the profits in the manufacture of the products during the census year. The census schedule takes no cognizance of the cost of selling, or of interest on capital invested, or of the mercantile losses incurred in the business, or of depreciation in plant.

Two tables that appear on the opposite page summarize fully the ship building industry of the country. The first table contains statistics of the entire industry, exclusive of establishments owned by the government, as returned at the censuses of 1850 to 1900, inclusive, with the percentage of increase for each decade. The second table shows the industry in 1900 divided as to wood, iron and steel construction, government establishments and establishments with a product of less than $500.

It is shown by these tables that the number of establishments engaged in the building and repairing of vessels, boats, etc., increased from 953 in 1850 to 1,116 in 1900, or 17.1 per cent., while the capital invested increased from $5,373,139 to $77,362,701, or 1,339.8 per cent. This is an increase in the average capital per establishment invested in the industry, from $5,638 in 1850 to $69,321 in 1900, or 1,129.5 per cent. During the same period the average number of wage-earners increased from 12,976 to 46,781, or 260.5 per cent. The total value of constructions and repairs increased from $16,937,525 to $74,578,158, or 340.3 per cent. Of the latter sum a large part represents work done for the navy and war departments. It was found impracticable to secure any statement from these departments covering the census year ending May 31; but it appears that during the year ending June 30, 1900, the sum of $8,554,862 was disbursed in the navy department to private ship building establishments for construction and repairs, and the sum of $5,493,556 in the war department, the total being $14,048,438, or 18.8 per cent. of the total value of products reported by private ship yards for the census year. Of the amount disbursed in the war department, $1,291,581 was for "fitting up chartered transports," the remainder being expended "for refitting and repairs of vessels owned by the war department." It is also shown by the tables that the capital invested in ship building in 1850 and 1860 was less than $6,000,000, a sum insufficient to replace any one of several existing iron and steel establishments. The value of the products in 1850 was more than three times greater than the capital invested, and in 1860 was more than twice as great. In 1900, for the first time in the census history of the industry, the value of products was less than the capital invested. The ratio of capital to product has steadily increased from 1850 to the present time. In 1850 the wages paid to labor exceeded the capital, but in 1900 was less than one-third the amount invested.

But as against all these proofs of growth of the industry there is the sad commentary that our progress is confined almost entirely to ships for domestic service; that we have a very small share of the world's carrying trade. This feature of the situation is very ably set forth in the bulletin by Alexander R. Smith, special census agent, who writes as follows:

GROWTH OF SHIP BUILDING CONFINED TO DOMESTIC TRADE.

"The growth of the ship building industry in the United States during the past ten years, as shown by the census reports, exceeds that of any preceding decade, and the tonnage constructed during the census year ending May 31, 1900, was greater than during any preceding year in the history of the United States, with the possible exceptions of 1854 and 1855. Although in other countries iron and steel long ago largely superseded wood as the chief material used in the construction of ships, the census statistics show that it was not until the last decade that metal ship building attained proportions greater than wooden in private ship yards of the United States. This substitution of iron and steel for wood has wrought a revolution in the ship building industry in the United States. The zenith of American ship building, judged by the tonnage annually added to the merchant marine, was reached during the decade between 1850 and 1860. At that time the superiority of ships built in the United States for endurance, speed and safety was conceded. It was the era of the American clipper. This class of wooden sailing ships commanded higher freight rates, even in Liverpool and London, than British ships, and insurance rates on American vessels and their cargoes were lower than on foreign ships. These advantages placed the United States in the very front rank in international trade-carrying competition. This prestige had been increasing ever since the successes achieved by the United States in the carrying trade during the Napoleonic wars. The easy convertibility of the wooden vessels of that time into ships of war gave a distinct naval strength and solidity to the nation. The passing of wooden ship building, therefore, as the dominent branch of the ship building industry in the United States, has an historical significance.

"One remarkable feature of the growth of the industry during the past decade is the fact that the product of merchant vessels has been so largely absorbed and employed in the domestic commerce of the country. Up to the time of the civil war the tonnage of vessels constructed in American ship yards for the foreign trade compared favorably with that for the domestic trade; and, indeed, the progress and prosperity of the industry rested largely upon the demands for vessels for foreign commerce. This is no longer true. Comparatively few vessels for foreign trade are now built in American ship yards. But in the meantime the enormous growth of internal commerce, together with the opportunities afforded by the extensive coast line of the United States, the great lakes, and the navigable rivers, which in many cases have been so deepened, at an expense reaching into hundreds of millions of dollars, as to accommodate the passage of the largest vessels, has greatly developed the demand for vessels in the domestic trade. This has not only kept alive our ship-building industry, but constitutes also, in large part, the foundation upon which it has expanded. Another important element in the growth of the industry has been the demand of the government for a new navy constructed in home ship yards.

"During the last four decades, therefore, the stability of the industry in the United States has rested almost wholly upon the domestic or coastwise trade, the vessels constructed for foreign trade representing but a small proportion of the entire output of the ship yards. Whether or not this is due to the fact that the domestic water-borne trade of the United States has by law been restricted to vessels built in the United States, need not here be discussed. These restrictions have existed since the foundation of the government, at first by statutory discriminations in favor of home vessels that practically excluded foreign tonnage, and, ever since the early part of the nineteenth century, by statutory prohibition. Under such restrictions ship building for the internal commerce of the United States has grown and prospered. On the other hand, in the foreign trade, to which foreign vessels for many years have been admitted upon terms of perfect equality with those of the United States, the foreign tonnage has maintained an almost constant increase, while the domestic tonnage has steadily diminished.

"The completeness of the decline of American shipping in the foreign trade may be briefly illustrated by quotations from the statistical history of the growth of the foreign commerce of the United States, showing the share in its carriage taken by American ships in the earlier years compared with the present time. In 1826 American vessels carried 92.5 per cent. of the foreign commerce of the United States, the value of which was $150,331,636, while in 1900 they carried 9.3 per cent., the value of which was $195,083,155, an increase in value of only 29.5 per cent. in seventy-four years. In 1826 foreign vessels carried 7.5 per cent. of our foreign commerce, valued at $12,238,163, while in 1900 they carried 90.7 per cent., valued at $1,894,445,461, an increase of 15,379.8 per cent. in seventy-four years.

"While the census returns do not indicate the particular trade in which the vessels built are to engage, other official records are at hand which in part supply the information. For instance, no vessel is permitted to engage in foreign trade unless provided with a register, a document issued by the government through its custom houses. Hence the American shipping under register accurately shows the total tonnage of the United States engaged in the foreign trade. The returns for the twelfth census show that the vessels of all kinds—sail and steam, steel and wood, including barges and canal boats—constructed in the ship yards of the United States in 1900 numbered 2,087, with a gross tonnage of 687,681 tons. The report of the commissioner of navigation for 1900 shows that eighty-eight American-built vessels, with a total of 29,069 gross tons, were registered for the foreign trade. This tonnage constitutes only 4.2 per cent. of the total product turned out by American ship yards in 1900, hardly equivalent to half a month's construction. Reports of the commissioner of navigation show further that during the ten years ending with 1900, 206,771 tons of vessels built in the United States were registered for the foreign trade, a total that is equal to only 30.1 per cent. of the tonnage constructed in ship yards of the United States for all purposes in the year 1900; that is to say, in less than four months of 1900 as much tonnage was built in American ship yards for all trades as was built in those ship yards for foreign trade during the entire ten years ending with 1900.

ABOUT 5,000,000 TONS IN SHIPS WOULD BE REQUIRED FOR OUR FOREIGN TRADE.

"Although the actual tonnage of different vessels, foreign and domestic, engaged in the foreign trade of the United States is not precisely known, estimates have been made by different commissioners of navigation which may serve as a basis for comparison. In the report of the commissioner of navigation for 1900 the tonnage necessary for the foreign carrying trade in 1899 is estimated at 3,571,284 gross tons of steam and 1,000,000 tons of sail, a total of 4,571,284 tons. This is the lowest official estimate that has been made. The commissioner of navigation stated in 1890 that 6,500,000 tons would be required to carry 83 per cent. of the foreign commerce of the United States at that time. That would make the tonnage required for carrying the entire foreign commerce of the United States 7,831,325 tons. Since that time the value of our foreign commerce has increased 36 per cent. In view of these expert official estimates, it would be conservative to state that fully 5,000,000 tons of shipping are now required for the carriage of the entire foreign commerce. Toward supplying that need home ship yards, as we have seen, contributed only 29,069 tons during the census year of 1900, and only 206,771 tons during the entire ten years ending with 1900. At the rate of construction in 1900 172 years would elapse before enough tonnage would be built for the present needs of our foreign trade. The average life of a ship is commonly computed at ten years, taking into account losses, accidents, and deterioration. But allowing twenty years as the average life of a modern steel steamship, at the present rate of construction for foreign trade over eight years would elapse before enough ships would be constructed to provide for the average losses of one year. In Great Britain, in 1899, steel steamships to the number of 567 were constructed, the tonnage of which aggregated 1,341,425, while in the United States 123 steel steam vessels aggregating 237,379 gross tons, were constructed for all kinds of trade, inland, coastwise and foreign. As a matter of fact only one steel steam vessel, of 1,771 tons, was built in the United States during 1900 for the foreign trade. On the great lakes alone vessels aggregating 111,241 gross tons were built in 1900, or 16.2 per cent. of the total tonnage built during that year in the United States, while the tonnage built under register, as previously stated, constituted but 4.2 per cent. of the total tonnage, or 26.1 per cent. of that constructed for the traffic of the great lakes. In number of tons, the merchandise moved annually upon the great lakes approximates very closely to the merchandise annually imported into and exported from the United States, but the distance it is carried is very much less. For this reason the commerce of the great lakes can be carried by use of a tonnage approximately one-third as large as is necessary for the carriage of our foreign commerce. And yet, notwithstanding the smaller

requirements of the traffic on the great lakes, the tonnage built for that traffic in 1900 was nearly four times that built for foreign trade.

"While in general our laws deny American registry to foreign-built vessels, there are exceptions provided by which such vessels may be registered if owned by citizens of the United States. For instance, a foreign-built vessel wrecked in American waters and purchased and repaired by a citizen of the United States may be registered 'if it shall be proved to the satisfaction of the commissioner (of navigation) that the repairs put upon such vessel are equal to three-fourths of the cost of the vessel when so repaired.' Congress also, by special enactment, admits foreign vessels to American registry from time to time, under exceptional circumstances. During the past ten years vessels of foreign construction, including Hawaiian tonnage and vessels captured from Spain, aggregating 134,859 tons, were admitted to American registry, a total equal to 65.2 per cent. of the tonnage constructed in domestic ship yards for the foreign trade during the same period.

"In 1890 the American tonnage under register, in our foreign trade, amounted to 946,695 tons, since which time 206,771 tons have been built in the United States and documented under register, and 134,859 tons of foreign-built vessels have been granted American registry. This would have made a total of 1,288,325 tons in 1900, had none gone out of existence. But in 1900 the tonnage under American registry was only 826,694, showing a loss of 461,631 tons during the ten years. The shrinkage is more than twice as much as the total new registered tonnage built in the United States during the decade. This indicates how hopeless, under present conditions, are the prospects of the ship yards of the United States maintaining even the present tonnage in the foreign carrying trade, to say nothing of providing the additional tonnage made necessary by the growth in volume of foreign commerce. An idea of the extent of this growth may be obtained from a study of the statistics of tonnage of foreign commerce entering at and clearing from seaports of the United States in 1890 and 1900. In 1890 the tonnage of American and foreign vessels entering the seaports of the United States from foreign ports was 15,465,604 tons; in 1900 it was 23,533,597 tons, an increase of 8,167,993 tons, or 53.2 per cent. in ten years. The tonnage of clearances in foreign trade is approximately that of entries, and consequently shows about the same percentage of increase.

"The domestic water-borne traffic of the United States is confined to vessels constructed and owned in the United States, and the growth of shipping in the domestic trade seems to be all that can be desired. The improvement of rivers and harbors has, during the last decade especially, proceeded upon an enormous scale with promise of continuance. These improvements make possible the use of craft of constantly increasing size; and freight rates being gradually decreased, the effect is inevitably stimulating upon the growth of domestic water-borne commerce. The growth assures to ship builders of the United States a steady demand for vessels adapted to the needs of domestic traffic.

WHY SHIP YARDS HAVE BEEN ESPECIALLY ACTIVE OF LATE ON NEW VESSELS FOR DOMESTIC TRADE.

"The recent territorial acquisitions of the United States, extending to the West Indies and the islands of the Pacific, our trade with which must be confined to vessels built in the United States, holds promise to ship builders of a demand for ocean-going vessels adapted to the trade requirements and harbor facilities of the ports of these possessions. Moreover, it is likely that the future growth of the navy will afford employment for many ship yards. Its growth during the past twenty years accounts, in very large degree, for the establishments of new and entirely up-to-date plants and the re-equipment of old plants with the modern facilities required for the construction of high-class naval vessels. These establishments are also prepared to enter upon the construction of vessels of any size or type for any trade; and the grade of work and fineness of finish demanded by the specifications for our war ships and insured by the thorough inspection under which they are built, are likewise evinced in the improvements shown in the constructions for our merchant service. The demand for yachts, steam and sail, of the finest and largest type, the finish and elegance of which are so notable, gives employment to men of the greatest efficiency in a number of our ship yards in different parts of the country.

"These are the varied demands upon our ship builders that form the broad underlying foundation of their present prosperous condition. But the constructions for the foreign trade of the United States, which afford, in other countries, investment for capital probably twice as large as is at present invested in the United States, furnishing employment to thousands of skilled workmen and providing an enormous market for materials, assume very small proportions in the ship yards of our own country. The demand for vessels in the foreign trade is so great that if it were supplied by American ship yards the average annual construction of these yards would be increased fully one-third in tonnage and probably doubled in value. The types of vessels engaged in the foreign trade are much more costly than those employed in domestic trade. Summing up the present situation, the paradox exists of a substantial number of establishments, equipped with every essential for the construction of ocean-going ships of every type, being limited to the construction of war ships and of vessels for our domestic trade, except for the infrequent and spasmodic requirements of a few courageous ship owners who persist in operating American-built ships in foreign trade. The very infrequency and uncertainty of this demand largely account for the fact that the cost of construction per ton is higher in the United States than in other countries, notably Great Britain, which probably builds four-fifths of the world's ocean-going tonnage, although less than three-fifths of it is under the flag of that nation. The anomalous condition of American ship yards, in respect of equipment for and output of ocean-going shipping, has attracted widespread attention and provoked world-wide comment. Precisely what should be done to increase United States shipping in foreign trade is the much discussed and still unsolved American maritime problem.

"As previously stated, 206,771 tons of ships for foreign trade were built in the United States during the past decade. During the same period 12,077,359 tons of steel steamships were built in the world's ship yards, of which Great Britain built 9,793,426 tons, or 81.1 per cent. In the United States only 742,830 tons of steel vessel were built during the past ten years, 450,089 tons of which were constructed upon the great lakes. The remainder, 292,741 tons, or 39.4 per cent. of the total, represents the constructions of the Atlantic and Pacific ship yards for the coastwise and ocean traffic. It should be stated in this connection that during the last three years of the decade 80,687 tons of American vessels were sold to the government, as compared with a total of 4,254 tons sold during the intervening years succeeding the civil war. This, naturally, created an abnormal demand for new tonnage, which is shown by the fact that of the 275,550 tons of steel vessels built on the Atlantic coast of the United States during the past decade, 138,888 tons, or more than one-half, were constructed in the last three years of that period, and 70,548, or more than one-fourth, in the year 1900. Since, however, 8,258 tons were bought back, the net purchases amounted to 72,429 tons. It is very easy to see, in the light of these large purchases, comprising in most cases vessels of the largest and most serviceable type for the needs of the government, what an abnormal demand for construction has arisen, leading to an unparalleled degree of activity in our ship yards. The acquirement of Porto Rico and Hawaii, and the restriction of that trade to American-built vessels, has also added to the demand for large vessels, in the construction of which a few of our ship yards are now engaged. The total documented tonnage annually lost, abandoned, sold, and exempted is quite large, the amount in the year 1900 being 156,862 tons. During the last decade 1,897,488 tons have been so withdrawn, an annual average of 189,748 tons. The documented tonnage of the United States in 1900 constituted only 57.3 per cent. of the tonnage constructed in the ship yards of

UNITED STATES CENSUS STATISTICS RELATING TO SHIP BUILDING—ONLY ESTABLISHMENTS OWNED BY THE GOVERNMENT ARE EXCLUDED FROM THIS SUMMARY.

	DATE OF CENSUS.						PER CENT OF INCREASE.				
	1900	1890	1880	1870	1860	1850	1890 to 1900	1880 to 1890	1870 to 1880	1860 to 1870	1850 to 1860
Number of establishments	1,116	1,006	2,188	964	675	953	10.9	[1]54.0	127.0	42.8	[1]29.2
Capital	$77,362,701	$27,262,892	$20,979,874	$11,463,076	$5,952,665	$5,373,139	183.8	29.9	83.0	92.6	10.8
Salaried officials, clerks, etc., number	1,407	[2]1,123	([3])	([3])	([3])	([3])	25.3	.....	.....	.....	.....
Salaries	$2,008,537	[2]$1,194,870	([3])	([3])	([3])	([3])	68.1	.....	.....	.....	.....
Wage-earners, average number	46,781	22,143	21,345	13,915	10,071	12,976	111.3	3.7	53.4	38.2	[1]22.3
Total wages	$24,839,163	$13,083,949	$12,713,813	$7,073,400	$4,539,313	$6,055,884	89.9	2.9	79.7	55.8	[1]25.0
Men, sixteen years and over	45,744	21,960	21,338	13,814	10,070	12,962	108.3	2.9	54.5	37.2	[1]15.3
Wages	$24,636,612	$13,055,083	([3])	([3])	([3])	([3])	88.7	.....	.....	.....	.....
Women, sixteen years and over	34	9	.....	6	1	14	277.8	.....	[1]100.0	500.0	[1]92.9
Wages	$11,424	$2,522	.....	([3])	([3])	([3])	353.0	.....	.....	.....	.....
Children, under sixteen years	1,003	174	7	95	([3])	([3])	476.4	2,385.7	[1]92.6	.....	.....
Wages	$191,127	$26,344	([3])	([3])	([3])	([3])	625.5	.....	.....	.....	.....
Miscellaneous expenses	$3,685,661	$1,392,551	([4])	([4])	([4])	([4])	164.7	.....	.....	.....	.....
Cost of materials used	$33,486,772	$16,521,246	$19,736,358	$9,379,980	$5,788,676	$7,420,496	102.7	[1]16.3	110.4	62.0	[1]22.0
Value of products, includ'g repair'g	$74,578,158	$38,065,410	$36,800,327	$21,483,967	$13,424,037	$16,937,525	95.9	3.4	71.3	60.0	[1]20.7

[1]Decrease. [2]Includes proprietors and firm members, with their salaries; number only reported in 1900. [3]Not reported separately. [4]Not reported.

SHIP BUILDING INDUSTRY OF THE UNITED STATES IN 1900 DIVIDED AS TO WOOD, IRON AND STEEL CONSTRUCTION, GOVERNMENT ESTABLISHMENTS, ETC.—FROM UNITED STATES CENSUS RETURNS.

CLASSES.	Number of establishments.	Capital.	Proprietors and firm members.	WAGE-EARNERS. Average number.	WAGE-EARNERS. Total wages.	Miscellaneous expenses.	COST OF MATERIALS USED. Total.	COST OF MATERIALS USED. Principal materials.	COST OF MATERIALS USED. Fuel, freight, etc.	Value of products, including repairing.
Total	1,229	$131,736,843	1,366	54,477	$31,063,176	$3,718 836	$37,303,618	$35,743,967	$1,559 651	$85,642,540
Iron and steel ship building	41	59,839,555	16	30,906	16,231,311	2,642,690	23,585,549	22,447,481	1,138,068	50,367,739
Wooden ship and boat building	1,072	17,523,146	1,239	15,875	8,607,852	1,042,971	9,901,233	9,638,159	263,064	24,210,419
Governmental establishments	9	54,291,011	.....	7,690	6,222,263	29,064	3,805,326	3,647,155	158,171	11,031,312
Establishments with a product of less than $500	104	83,131	111	6	1,750	4,111	11,520	11,172	348	30,070

the United States during that year, as disclosed by the census returns. The undocumented tonnage consists of a class of shipping which is much lighter, more frail, and more short-lived, so that it is reasonable to believe that the annual loss in this tonnage fully equals that in the documented. Therefore, there is an annual demand, merely to make good average losses, for new tonnage aggregating between 300,000 and 350,000 tons, so that losses alone in our national shipping create a steady demand for what may be regarded as a substantial annual total of new tonnage—more than one-half, probably, of the tonnage constructed during the year 1900.

"Although iron ships were constructed in American ship yards previous to the inauguration of the new navy, which were almost wholly employed in domestic trade, modern steel ship building is contemporaneous with the growth of the new navy, the first vessels for which were launched about sixteen years ago. These initial constructions led to the equipment of a few of the ship building establishments in operation at that time with plants edequate for the production of modern ships of war, and these plants, with others that have been established since, are equally capable of producing steel merchant vessels of the highest type, a limited number of which, in every way a credit to the skill of the ship builders, have been turned out during the last decade."

FLUCTUATION OF WATER LEVEL ON LAKE ERIE.

Mr. Alfred J. Henry, professor of meteorology, has prepared under the direction of Willis L. Moore, chief of the United States weather bureau, a pamphlet upon the subject "Wind Velocity and Fluctuations of Water Level on Lake Erie." Considerable information of a general character regarding the lake is contained in the pamphlet. The total area of the lake is about 10,000 square miles. The contour of its bottom is such that for convenience of description it may be divided into three basins, namely, western, main and eastern. The western basin has an area of about 1,200 square miles and comprises all that portion west of the islands. The bed of this basin is comparatively level and the average depth of water is about 30 ft. The main or middle basin has an area of about 6,700 square miles and comprises that portion of the lake between the islands on the west and the narrows between Long point and Erie on the east. The main basin has a shelving bottom, the depth increasing gradually to about 80 ft. The eastern basin has an area of about 2,100 square miles and comprises that portion of the lake east of the narrows. The greatest depth in the lake, 180 ft., is found in this basin off Long point. Mr. Henry says:

"The prevailing winds on Lake Erie are westerly, the proportion varying somewhat with the season of the year. At Detroit, near the western end of the lake, 69 per cent. of the winds are from a westerly quarter; at Cleveland, on the south shore and near the middle of the lake, 43 per cent. are from a westerly quarter, while at Buffalo, on the eastern end, 61 per cent. are from a westerly quarter. The resultant winds for each month of the year are given in the table below.

RESULTANT WIND DIRECTIONS AT STATIONS ALONG LAKE ERIE, BASED ON RECORDS OF FIFTEEN YEARS.

Stations.	Jan.	Feb.	March.	April.	May.	June.	July.
Detroit	S. 67 W.	S. 80 W.	N. 60 W.	N. 9 W.	S. 43 W.	S. 35 W	S. 67 W.
Toledo	S. 51 W.	S. 57 W.	N. 81 W.	N. 79 W.	S. 61 W.	S. 40 W.	S. 64 W.
Cleveland	S. 33 W.	S. 41 W.	S. 78 W.	N. 10 W.	N. 79 E.	S. 38 E.	S. 16 E.
Erie	S. 46 W.	S. 60 W.	S. 82 W.	S. 84 W.	S. 57 W.	S. 44 W.	S. 70 W.
Buffalo	S. 57 W.	S. 54 W.	S. 72 W.	S. 53 W.	S. 49 W.	S. 44 W.	S. 58 W.

Stations.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Detroit	S. 35 W.	S. 60 W.	S. 70 W.	S. 69 W.	S. 75 W.	S. 73 W.
Toledo	S. 67 W.	S. 35 W.	S. 40 W.	S. 52 W.	S. 51 W.	S. 57 W.
Cleveland	S. 73 E.	S. 30 E.	S. 7 E.	S. 27 W.	S. 35 W.	S. 16 W.
Erie	S. 16 W.	S. 13 W.	S. 27 W.	S. 46 W.	S. 47 W.	S. 48 W.
Buffalo	S. 49 W.	S. 52 W.	S. 62 W.	S. 73 W.	S. 74 W.	S. 57 W.

"From the above table it may be seen that the winds on the south shore east of Cleveland show less variation from a westerly quarter throughout the year than elsewhere on the lake. On the western end of the lake southerly winds prevail in winter, shifting to westerly and northwesterly with the advance of spring and back to west and southwest in summer. At Cleveland the prevailing winds appear to box the compass during the twelve months, being southerly in January, westerly in February and March, northerly and northeasterly in April, southeasterly in May and June, variable in July, southeasterly in August, September and October, and southwesterly in December. The unusually large number of southeasterly winds at this station is not clearly understood, unless, as suggested by Local Forecast Official Kenealy of Cleveland they are due to land and lake breezes. While the prevalence of lake breezes in the warm season would account for a large number of southeast winds, it should be remembered that frequently brisk to high southeast winds are observed at Cleveland, while at other lake stations the winds are southerly.

"The frictional action of the wind on the surface of a body of water is manifested in various ways. First, a surface current is produced in the direction in which the wind blows. Second, it piles up the water on the shore which is directly opposed to the flow of the current and in the case of lakes and other landlocked bodies of water depresses the level of the water on the weather shore. Third, it alters the temperature of the surface waters both by mixture and the importation of waters having different temperatures. Of these effects the first named is by far the most important. On land, the frictional action of the wind, owing to the fixed and more or less rigid character of the objects interposed in its path, is scarcely appreciable, but when a wind of moderate force blows over a mobile surface for days and days—always in the same, or nearly the same direction, as in the region of the trade winds—a current is produced and maintained so long as the wind continues to blow.

"Surface currents are also produced in the ocean in regions where the prevailing winds largely outnumber those from any other quarter, as, for example, in the North Atlantic, where the prevailing winds are westerly. Currents so produced are frequently interrupted, since the surface waters quickly respond to a change in the direction of the wind, yet the general drift of the water must always follow that of the wind for the same period.

"The currents of the great lakes produced by the winds are feeble in comparison with those of the ocean. The area of water surface exposed to wind action is relatively small as compared with that of the land, and in consequence of the greater frictional resistance of the land the velocity acquired by the wind in the lake region, though higher than in many parts of the United States, is still considerably below that which prevails over the ocean.

"The water that is transported by the winds from one end of the lake to the other can not return as a surface current, since the force which urges it forward naturally operates to prevent its return. The surface water that is drifted eastward across the Atlantic between latitudes 30° and 50° north and banked up against the continent of Europe, unlike the lake waters, escapes in three ways, viz, downward and to the northward and southward. In the case of Lakes Superior, Erie and Ontario, which are so situated with regard to the prevailing winds that easterly surface currents must prevail, there is probably a small volume of water, in excess of the normal flow, brought to the eastern ends of the lakes by the winds. This water, which ordinarily can not be of great volume, is usually disposed of through the natural outlets. When, however, strong westerly gales prevail the volume of water piled up at the eastern end of the lakes is generally so great that it can not be carried off by the river outlets, nor can it return as a surface current; it must, therefore, escape downward and westward as a return current beneath the surface.

"The disturbances of level on Lake Erie, on account of the shallowness of the water at both ends of the lake, constitute at times a serious menace to navigation. The United States engineer corps, in charge of the survey and improvement of the great lakes, has maintained for many years a system of tridaily eye observations of the level of the water of the several lakes. During quite recent years automatic gauges have been put in operation on Lake Erie and also on the connecting rivers between Lakes Huron and Erie. The surface of the lake is never in absolute repose. The effect of a light breeze is to disturb the smooth surface of the water and to produce minute waves or corrugations in the surface film which disappear immediately upon the removal of the disturbing cause. As the velocity of the wind increases, small waves are produced uniformly over the surface of the water. If now the whole surface of the lake be subjected to a wind blowing uniformly in the direction of its longer axis the surface waters will be pushed along in the direction of the wind, as shown by Sir John Murray in his observations of temperature in the Scottish lochs. It is extremely doubtful, however, owing to the great length of Lake Erie, whether water is actually transferred from one end to the other, but there can be no doubt of the fact that, under the influence of strong winds, the particles of water have a motion of translation and effect a permanent change of place.

"It seems probable that the first effect of a strong wind upon the waters of the lake is to transfer from one end toward the other sufficient water to disturb the condition of hydrostatic equilibrium which existed before the wind began. Shortly after the maximum force of the wind has been exerted the lake tends to return to a state of stable equilibrium. The water that has been piled up on the leeward shore of the lake will immediately recede, although the velocity of the wind may continue high for several hours after the water falls. A condition of stable equilibrium is reached by a series of rockings of the water of the whole lake about a nodal line passing through the center of the lake, the water at either end rising and falling alternately until a condition of rest is attained. As a matter of fact the rockings do not continue uninterruptedly until the lake comes to rest, since the wind in the cold season generally becomes sufficiently strong a day or so after the storm has passed to overcome them. If, however, the winds are light the lake will continue to rock until equilibrium is restored."

SHIP YARD NOTES.

C. & R. Poillon, Brooklyn, N. Y., are building a staunch steam propeller for James E. Ward & Co. of New York for service in Cuban waters. The timbers and other material entering into her construction are of first-class. Her keel is 12 by 12 in. oak; the frame is of oak and hacmatack 6 by 10 in., doubled, planked with 4 by 9 in. yellow pine to water line, with 3½ in. above. The garboards are 4 by 15 in. oak; the ceiling of 3-in. yellow pine. She has two sister keelsons 8 by 12 each, bolted through, two rows of bilge keelsons 10 by 12 each, and two tiers of 4 by 12-in. clamps; the six thick strakes are 4 by 9 in. each. She will be fastened with composition, galvanized and locust fastenings. Her deck is to be in keeping with the rest of her build, the main beams being 12 by 12 and the intermediate ones 6 by 12 in. each; the deck will be of 3 by 5 in. white pine. Her deck erections will consist of deck house for galley, engine room and officers' quarters, and on the upper deck will be placed the pilot house, captain's room, saloon and passenger accommodations. The steamer will have good freight room on deck and will be fitted with a strong derrick mast. She will have a compound engine furnished by John W. Sullivan of New York, and steam will be supplied by a Scotch boiler.

The steamer Gen. Putnam was launched from the ship yard of the Pusey & Jones Co., Wilmington, Del., last week. She is a steel hull, screw steamer and will be used in the passenger and freight business between New York and Greenwich, Conn. Her dimensions are: Length, 130 ft.; beam, 30 ft.; depth, 9 ft. She has an inverted, direct-acting, compound engine with cylinders 14 and 26 in. in diameter and 22 in. stroke.

The new steamship Ransom B. Fuller for the Eastern Steamship Co. was launched from the yard of the New England Ship Building Co., Bath, Me., last Saturday. The Fuller is a three-decker, 300 ft. long, 39 ft. beam, 14 ft. deep and 8½ ft. draught. She will have sleeping accommodations for 750 passengers.

The United Engineering Works of San Francisco has lately received an order for a steel steamer 162 ft. long, to be used on the coast as a lumber carrier. She will be equipped with oil burning apparatus and use oil for fuel. They have also under construction a tug boat 70 ft. in length for general service.

At Dickey's Ship Yard, Alameda, Cal., work has been begun on the hull of the new wooden steam schooner which is to ply on the Pollard Steamship Co.'s line between San Francisco and Gray's Harbor. She will measure 160 ft. in length, 36 ft. beam and 12 ft. 6 in. deep. Her carrying capacity will be 600,000 ft. of lumber.

WIDESPREAD EFFECT OF COAL STRIKE.

Attention has been focused on the coal situation by the strike in the anthracite field. The best obtainable statistics show that the number of mine employees in the United States is about 467,000. This includes soft coal and anthracite mining employees in the whole United States. No one expects the present strike, however, to extend to the bituminous fields. The soft coal operators are satisfied that their men are content and none of them are anticipating trouble. It is interesting at this time to inquire into the coal producing capacity of the United States. It is as follows, based upon the latest statistics:

	Production in tons.	Men employed.
Pennsylvania (anthracite)	67,418,000	150,437
Pennsylvania (bituminous)	88,500,000	96,800
Illinois	26,618,000	39,500
West Virginia	22,759,900	29,365
Ohio	20,111,000	28,136
Indiana	6,939,000	11,980
Iowa	5,463,000	13,275
Kentucky	4,820,000	8,620
Maryland	4,978,400	10,560
Missouri	3,697,000	5,350
Alabama	9,226,000	14,680
Tennessee	4,396,000	8,500
Colorado	5,978,000	7,829
Virginia	2,788,500	3,860
Wyoming	4,393,000	5,283
Texas	1,256,000	2,960
Utah	1,382,000	1,780
Total, United States	298,811,100	466,873

Coal strikes are, of course, the most ruinous of strikes, because their influence is so widespread. Railways and mills are the chief interests involved. The quickest way to paralyze industry is to cripple transportation and iron making.

Statistics of the effect of strikes on coal output and the earnings of the companies concerned are not available in satisfactory form. Taking the statistics as reported by the anthracite coal producing companies during the period of the strike of 1900 interesting figures bearing on this point may be given. That strike began on Sept. 17 and ended on Oct. 29. How the strike affected output may be seen from the following statement of anthracite coal shipments by months for the last three years, beginning with July:

	1901.	1900.	1899.
July	3,698,814	3,599,729	4,189,250
August	4,710,517	4,951,166	4,319,031
September	4,379,157	2,972,948	4,502,880
October	4,988,132	834,786	4,899,303
November	4,697,443	4,994,799	4,688,859
December	3,623,423	5,075,189	4,502,832
Six months	26,097,486	22,419,617	27,102,155
Twelve months	53,657,601	45,107,484	47,665,203

In 1900, up to Aug. 31, anthracite coal shipments were 2,500,000 tons more than in the same months of 1899. In September and October the production fell off 5,595,000 tons, or 63 per cent., and increasing tonnage in the next few months could not overcome this loss. The summaries of earnings and expenses by the principal railways reporting follow:

	Gross earnings.		Net earnings.	
	1900.	1899.	1900.	1899.
July	$ 9,918,725	$ 10,172,510	$ 1,652,129	$ 2,315,414
August	11,493,720	11,034,789	2,607,778	2,384,635
September	10,855,312	11,229,350	1,892,931	2,715,210
October	7,099,643	14,057,517	211,607	3,212,271
November	7,073,130	7,240,043	2,013,894	2,045,110
December	10,589,705	9,505,108	1,997,893	1,854,306
Six months to June 30:	58,809,800	53,684,700	12,243,400	11,377,000
Six months to December 31:	98,097,800	104,399,300	22,689,200	29,098,300
Twelve months to December 31:	156,907,600	158,084,000	34,932,600	40,475,300

Thus in the six months to June 30, 1900, gross earnings of the anthracite railways increased by over $5,200,000, or over 10 per cent., and net earnings increased by $866,000, or 7 2/3 per cent. For the year, however, the gain in gross was lost and $2,000,000 more. The loss in net, through increased expenses, was almost as great in actual figures, running up to $5,543,000, or 13 2/3 per cent.

APPROPRIATIONS FOR RIVERS AND HARBORS.

The following statement of appropriations for river and harbor improvements, made by the United States government since 1879, was prepared recently by Hon. T. E. Burton, chairman of the committee on rivers and harbors of the house of representatives:

APPROPRIATIONS FOR RIVER AND HARBOR IMPROVEMENTS.

1879	$ 8,201,700.00	1892	$ 2,951,200.00
1880	7,846,600.00	1893	21,968,218.00
1881	8,951,500.00	1894	14,166,153.00
1882	11,441,300.00	1895	20,043,180.00
1883	18,738,875.00	1896	11,462,115.00
1884		1897	16,244,147.00
1885	13,949,200.00	1898	20,832,412.91
1886		1899	14,627,449.56
1887	14,473,900.00	1900	25,110,038.94
1888		1901	16,285,605.75
1889	22,397,616.90	1902	7,046,623.00
1890		Total	$301,874,130.06
1891	25,136,395.00		

NAVAL APPROPRIATION BILL PASSES THE HOUSE.

The naval appropriation bill, after a week's consideration, has passed the house. Interest in the measure centered around the proposition recommended by the committee which prepared the bill that one battleship be constructed in a government navy yard. Despite opposition the following provision was adopted by an overwhelming vote:

"The secretary of the navy shall build at least one of the battleships, one of the armored cruisers and one of the gunboats herein authorized in such navy yard as he may designate. And for the purpose of preparing and equipping such navy yard or navy yards as may be so designated for the construction of such ship or ships, the sum of $175,000, or so much thereof as may be necessary, is hereby appropriated for each of the navy yards in which the secretary of the navy may direct any ship or ships to be built."

The provision for the establishment of a naval training station on the great lakes was stricken out. An amendment was adopted changing the name of naval cadets to midshipmen.

PERSONAL ITEMS.

Mr. Clement A. Griscom, president of the International Navigation Co., has purchased the steam yacht Alvina.

Messrs. Diericx and Trist, who have been a long time connected with the drafting department of the American Ship Building Co., left Cleveland a few days ago to take up new positions with the Risdon Iron Works of San Francisco, Mr. Diericx as general superintendent. Associates of Mr. Diericx in the Cleveland works presented him with a beautiful diamond pin.

Mr. Edwin S. Mills, assistant general manager of the Pittsburgh Steamship Co., who was seriously ill, has been earnestly congratulated by a great many business friends since his return to Cleveland a few days ago, after a rest of several weeks in California. It is said that a position of more importance than he has as yet occupied in the steel industry has been offered to Mr. Mills at the headquarters of the Steel Corporation in New York. This is only rumor, but it is certain that Mr. Mills has made friends in the lake region who wish him the best that there is within the wide scope of the big organization.

TRADE NOTES.

The Livingstone Manufacturing Co., Rockland, Me., are supplying the wire rigging for two vessels now building at the yards of Arthur Sewall & Co., Bath, Me.

A band saw was recently shipped by the Atlantic Works Incorporated of Philadelphia to Mr. Herbert Garison of Bridgeton, N. Y. The machine will be used in Mr. Garison's boat yard.

The Nicholson ship log, which is manufactured by the Nicholson Ship Log Co. of Cleveland and is one of the finest devices of a log kind on the market, is to be used by the big side-wheel steamers Eastern States and Western States, now going into service between Detroit and Buffalo.

Mr. J. W. Duntley and Mr. E. N. Hurley of the Chicago Pneumatic Tool Co. have just returned from abroad. Both have been at work in England consolidating business interests and securing contracts from the British admiralty and a number of private ship yards for the pneumatic riveting of the steel hulls of ships. Mr. Duntley, who is president of the Chicago company, said: "We have succeeded in convincing the admiralty experts of Great Britain that with the increased thickness in the hulls of modern ships pneumatic riveting tools are necessary. I shall return shortly to be present at a series of tests of our pneumatic tools to be given at the Portsmouth dock yard, at which all the leading ship builders of Great Britain will be represented. We have practically purchased the International Pneumatic Tool Co. of Great Britain and this leaves us without serious competitions in this field. The final details are yet to be arranged, but the thing is as good as done. The amount to be paid for the plant and property of the British company is nothing like that mentioned. The deal is really only of secondary importance, and was thought advisable, owing to the present substantial condition of the ship building industry. The works of the company are at Chippenham, Wiltshire."

STEEL CASTING CONSOLIDATION.

Promoters of the steel casting consolidation propose to make the capital stock $40,000,000, of which $20,000,000 will be in 7 per cent. cumulative preferred, both as regards assets and dividends, and $20,000,000 in common stock. The intention is to issue $7,500,000 of each class at once. Concerns to be taken over by the new company are said to be as follows: American Steel Casting Co. of New Jersey, with active plants at Thurlow, Pa., Sharon, Pa., and Alliance, O., and unoperated plants at Norristown, Pa., Syracuse, N. Y., and Pittsburgh; Reliance Steel Casting Co., Limited, of Pittsburgh; Leighton & Howard Steel Co. of St. Louis, Mo.; Franklin Steel Casting Co. of Franklin, Pa.; Sargent Co. of Chicago; American Steel Foundry Co. of St. Louis, Mo.

Commissioner of Navigation Chamberlain has not made a new ruling regarding the penalty to which naphtha launches are liable if navigated without lights. The commissioner does not make laws. That is a power of congress. A dispatch from Toledo, following the loss of several lives through the sinking of a naphtha launch in that harbor, would convey the idea that Mr. Chamberlain immediately sent out an order requiring lights on naphtha launches. Such is not, of course, the case. Mr. Chamberlain simply pointed out to the collector of customs at Toledo the law on the subject. It is a part of the White law (act of Feb. 28, 1895), which is the "rules of the road" for the great lakes. The very first rule in this act requires naphtha launches to show lights just as the largest of the steam vessels show them. This first rule, which is preliminary to numerous requirements of the act, says very plainly that the word steam vessel shall include any vessel propelled by machinery.

It is now definitely said that control of the Cunard line cannot be secured privately, as none of the directors control sufficient stock to sell out the property. If J. P. Morgan accomplishes anything with the Cunard line it will be by means of a company meeting of which the public would certainly know something.

ITEMS OF GENERAL INTEREST.

The annual meeting of the Pacific Mail Steamship Co. will be held on May 28.

May 29 is the date of the annual meeting of the William Cramp & Sons' Ship & Engine Building Co. of Philadelphia.

The Boston Marine Society has petitioned congress to pension members of life-saving crews on the same basis as United States soldiers.

Rear-Admiral Charles O'Neil, chief of the bureau of ordnance, has gone to Dusseldorf, Germany, to attend an international congress of naval architects.

The Vulcan Ship Building Co., Stettin, builders of the steamers Kaiser Wilhelm der Grosse, Deutschland and Kronprinz Wilhelm, intends to establish a new ship building plant on the Elbe, below Hamburg, for the construction of large commercial and naval vessels.

The latest record of the Kaiser Wilhelm der Grosse, made last week, is as follows: Time of passage, 5 days, 18 hours and 6 minutes; days' runs, 424, 561, 566, 568, 572 and 455; total distance, 3,146 knots; average speed, 22.78 knots. This is the steamer's best westward average.

A new Anchor line steamer, the Columbia, had her trial trip on the Clyde last week and it proved quite successful. She logged 18 knots. She will start on her maiden trip for New York on June 17. The Columbia is the largest vessel in the Glasgow-New York service. She is 500 ft. long and of 15,000 tons burden.

A dispatch from Cherbourg announces that several improvements have been made in submarine boats by the French government recently. A new periscope enables them to survey the surface from a depth of fifteen meters, while formerly it was limited to a depth of six meters. The new periscope is telescopic. Formerly it was necessary for the submarine boats to keep in constant motion. Now a buoy floating beneath the surface enables them to moor.

An instrument of the megaphone type, by a Belgian inventor, has recently been fitted up experimentally on two of the British mail boats using the harbor of Calais, for the more perfect recording of the distance and direction of sounds of fog horns and other signals, while the French boats are provided with powerful electric projectors, sending forth a long and wide band of light in any desired direction, with a system of luminous signals for optic telegraphy.

The Dutch merchant navy consisted on Dec. 31 last of 652 vessels, measuring altogether 382,102 registered tons, against 638 vessels and 346,783 tons at the end of the year 1900. There is, therefore, an increase of fourteen ships and 35,319 register tons. Of the whole number of vessels, 235 are steamers measuring in the aggregate 306,694 registered tons; besides which there are seven full-rigged sailing ships (11,926 tons), thirty barques (28,281 tons), two brigs (507 tons), and a number of smaller sailing craft.

The Toyo Kisen Karsha (Japanese line), at present operating the fine twin-screw steamers America Maru, Nippon Maru and Hongkong Maru between San Francisco and the Orient, is receiving bids for the construction of two or three large modern passenger steamships to be placed on the same route. Bids have been solicited from American and British builders. The new steamers are to be 560 ft. in length, with a breadth of 63 ft. and depth of 38 ft., and will have a capacity of 11,500 or 12,000 tons. Their speed must be over 19 knots. In size and equipment the new steamships will about equal the Korea and Siberia of the Pacific Mail line, but are expected to be more attractive vessels.

The output of the Cape Breton coal mines for the fiscal year ending Sept. 3, 1901, amounted to 2,618,934 tons. Of this amount 2,352,567 tons was produced by the Dominion Coal Co. from its group of mines located about Sydney, North Sydney, Glace bay, and other places, being an increase of about 700,000 tons over its output of the previous year. Arrangements have recently been made by the Cape Breton Coal, Iron & Railway Co. for developing a group of mines lying south of Sydney on the line of the Cape Breton railway, which promise to be equally productive with those north of Sydney and to add materially to the coal activities of Cape Breton and bring a large tonnage to the Cape Breton railway.

The twenty-eighth annual meeting of the Michigan Pioneer and Historical Society will be held in Representative hall, Lansing, Mich., on June 3, 4 and 5. Mr. C. M. Burton of Detroit is the president and Mrs. Ellen B. Judson of Lansing, the secretary. Among the speakers will be the following: Gov. A. T. Bliss, President J. L. Snyder, Mrs. T. C. Taylor, Hon. H. R. Pattengill, Mary E. Chamberlain, C. T. Thorpe, B. F. Davis, Dr. R. C. Kedzie, H. B. Baker, L. M. Miller, J. R. Bailey, B. M. Cutcheon, C. H. Chapman, J. W. Humphrey, J. E. Day, F. Hodgman, C. F. Wheeler, Lt. Gov. O. W. Robinson, C. H. Dewey, W. J. Beal. Many of the addresses will be of undoubted historical significance.

Jones & Laughlins, Ltd., Pittsburgh, Pa., is to be changed from a limited partnership to an incorporated company. On June 2 an application is to be made at Harrisburg for the incorporation of the Jones & Laughlin Steel Co. of Pittsburgh to succeed the old firm which now controls the vast interests that have helped to make Pittsburgh the greatest steel center in the world. Jones & Laughlins, Ltd., is capitalized at $20,000,000. This figure is known to be a low one for the immense interests owned by the company. Under the name of the Jones & Laughlin Steel Co. all of the present stockholders will retain their same proportionate interests and there will be practically no change in the officers. The application for the new charter will be signed by Benjamin F. Jones, Jr., Willis L. King, William Larimer Jones, James B. Laughlin and Irwin B. Laughlin. These are the present officers of the firm.

The Nautical Preparatory School is the name of a company incorporated to conduct a nautical school on a plan never before attempted. It is literally a sea-going academy, and a vessel to be named Young America is to be built by the school. Her dimensions will be 250 ft. on the load water line, 44 ft. beam and 19 ft. draught. The officers of the company are: Lieut. Com'dr C. H. Harlow, president; Lieut. G. H. Elswald, vice-president and general manager, and C. H. Howland, secretary and treasurer. The board of directors comprise Rear-Admiral Luce; C. L. Weir, president of the Adams Express Co.; S. M. Felton, president of the Chicago & Alton railroad; J. W. Miller, superintendent of the marine division of the New York, New Haven & Hartford railway; W. F. King, ex-president of the Merchants' Association of New York; William McAdoo, former assistant secretary of the navy; Rev. Charles A. Dickey, president of the Presbyterian hospital of Philadelphia, and Robert S. Sloan of Oswego, N. Y.

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"LA TOURAINE"	(modern)	"	"	10,000	"	12,000	"
"L'AQUITAINE"	(modern)	"	"	10,000	"	16,000	"

Naval officers command above steamers, insuring the same strict discipline as on a man-of-war. These ships all have double bottoms and water-tight compartments, and prescribed routes are taken to avoid fogs. The above steamers contain every modern twentieth century equipment for safety, most luxurious accommodations, and the cuisine is famous. The favorite route of the elite of both continents. For rates, plans and other particulars apply to

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A HISTORY OF THE LAKE SUPERIOR IRON COUNTRY

THE MARINE REVIEW RECENTLY PUBLISHED A BIOGRAPHY OF THE HON. PETER WHITE, OF MARQUETTE, MICH., WHICH ATTRACTED WIDESPREAD ATTENTION THROUGHOUT THE COUNTRY, AND RESULTED IN A QUICK SALE OF THE ENTIRE ISSUES IN WHICH IT WAS PUBLISHED.

There were two reasons for this: The first was that the personality of the HON. PETER WHITE is fascinating and that it has been given to very few men to live the life which he has lived. He went into the upper Peninsula of Michigan almost immediately upon the discovery of iron ore, and, as a slender stripling, assisted in the exploitation of the first iron mine. He penetrated the trackless wilds with Indians and dog sleds to fetch and carry the mails and in an hundred ways he sought to develop this wonderful iron country. His life is *romance;* it is high light against the background of the greatest industrial revolution that the world has ever seen. It is these great deposits of iron in the Lake Superior country which have made the United States the great manufacturing nation that it is. They have literally moved the world's steel-making center west of the Allegheny mountains. Peter White's manly, sturdy life has continually been a part of this procession of progress. This is the first and great reason for the avidity with which the biography was seized upon. The second reason is that the biographical sketch contained a complete and authentic history of the Lake Superior iron country, bringing out many facts of great historical significance never before published.

The MARINE REVIEW proposes now to amplify the biography and to bring it out in book form, abundantly illustrated. We believe that it will add a new and interesting chapter to American history. It will, at any rate, be a distinct addition to the literature of the great state of Michigan.

We will be greatly aided by orders for the book now, *but don't send any money.* It will be time enough to send that when we send you the book. If you don't want the book when you see it, you can send it back to us at our expense. That's fair, isn't it?

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May we have your order? We would like it now because it will enable us to determine, in a measure, how many to print.

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Marine Review Publishing Co.

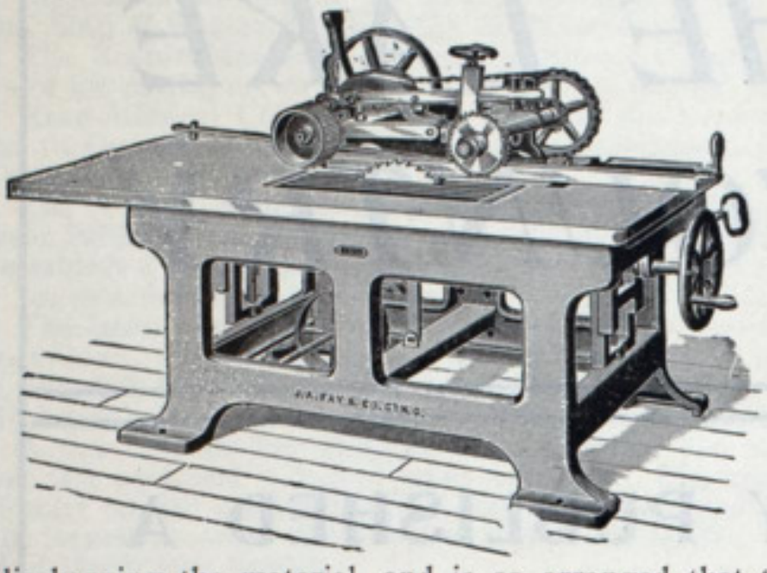
39-40-41 WADE BUILDING

CLEVELAND, O.

"PRESERVO" WILL NOT CRACK, SCALE, FREEZE OR STICK—SEE PAGE 8.

A NEW RIPPING SAW.

A tool especially adapted to the heavy ripping done in ship yards is illustrated and described herewith. This machine embodies many features that facilitate work and at the same time insure the best possible results.



Attention is called to a few advantages claimed by the manufacturers. It is very powerful, and is designed for ripping parallel strips of material where a large amount of heavy work is required. The feed, which is very strong, consists of a feed shaft and toothed disk for feeding, with a shaft fitted with either a fluted or smooth roll for discharging the material, and is so arranged that the entire mechanism can be lifted out of the way if desired to use the machine as a hand rip saw. The table is made either of iron or hardwood, with a detachable section around the saw, so that heads for gaining, rabbetting, etc., or a series of saws for ripping several pieces at a time may be used. The fence is long and has a movement across the table by hand lever, which instantly releases, moves and locks, or vice-versa, and has an index to gauge the distance at which it is set from the saw.

Friction rolls are placed just before and after the saw to diminish friction. The machine can also be fitted with a side roll and bevel attachment for making siding, for any angle or thickness. Shops that do not have much heavy work will find this a very fine addition, as it will save using a separate machine and may be applied to light resawing.

The makers of this machine. J. A. Fay & Egan Co., Nos. 325 to 345 West Front street, Cincinnati, Ohio, will willingly furnish further particulars and special terms, and will also send cuts showing it to better advantage and more in detail.

The Marine Iron Works, station A, Chicago, have just issued a new 48-page catalogue descriptive of their product, which they will send free on receipt of request. A separate pamphlet issued by the same company, devoted especially to "River Navigation" (shallow water stern wheel boats), will also be included if asked for. 1

Hay & Wright, Oakland, Cal., are building a four-masted barkentine for the Union Oil Co. of California.

Steam Yacht for Sale.

Steam yacht, 35 ft. over all, 7 ft. beam; burns kerosene; has electric light; is in first-class order. J. L. Alberger & Son, Ellicott Square, Buffalo, N. Y. May 22.

Position or Partnership.

A ship and engine builder, with a thorough experience in all branches of the business, both theoretical and practical, and with a reputation that compares favorably with that of any ship builder in the country, is desirous of opening negotiations with persons anxious to engage the services of a strictly first-class man, either to start a new yard of the most advanced type, or with a view to developing an established plant along the lines of the most economical policy known to American ship building. Experienced in all types of steamships, including battleships, cruisers, torpedo boats, Atlantic liners, yachts, etc., and particularly equipped for the construction of cheap and economical freighters and tramp steamers.

As an evidence of good faith I am willing to invest $20,000 with my services in a promising concern that will bear the strictest investigation. No small offers considered.

Address MANAGER OF SHIP YARD,
Care of Enoch W. C. Greene, Attorney-at-Law, 333 Walnut St., Philadelphia, Pa.

Sailing Vessel Wanted.

Vessel of 200 tons; 10 ft. draught, loaded; centerboard. Address P. O. Box 72, Mobile, Ala. May 29.

Scotch Boiler For Sale.

Scotch boiler, 14 ft. diameter by 13 ft. Lying at Detroit Ship Building Co.'s Works. Address James Corrigan, 41? Perry-Payne bldg., Cleveland. tf.

Engine and Boiler Wanted.

Wanted—A 14x16 or 16x16 marine engine; also boiler of sufficient capacity to supply steam for same at not less than 125 lbs. pressure. Address 407 Chamber of Commerce building, Toledo, O. May 29.

Barge For Sale.

Of about 500 M lumber capacity. Rates A2½. In good shape. Practically all rebuilt a year ago. Thoroughly recalked this winter. Price $3,500. Address Box 27, the Marine Review Pub. Co., 39-41 Wade building, Cleveland. tf.

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Originated 1849 — Latest Patents 1902

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890	67,728	2,460										
1891	68,247	68,331	204									
1892	68,247	68,403	69,822	23,259								
1893	68,379	68,343	68,286	68,247								
1894	68,439	68,367	68.574	68,439	37,701							
1895	68,673	68,766	68,739	68,808	40,887	28,713						
1896	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
1901	44,220	69,627	69,594	66,948	51,057	62,460	62,490	61,743	62,688	43,866	62,466	63,126
Total	801,723	783,264	714,378	664,371	438,576	418,836	355,173	271,257	234,870	172,596	148,416	115,266

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